

The AWA Journal

Quarterly Bulletin of the Antique Wireless Association®

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Volunteer Joe Granica, WB2G, removing some of the remaining artifacts from the Museum Annex. See "At The Museum."



Published for the radio collector, historian, restorer and all vintage communications enthusiasts.

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THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION™

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A.W.A. ELECTRONIC COMMUNICATION MUSEUM: Please see "At the Museum" column for contact and administration information.

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FROM THE DIRECTOR



During World War II, my parents took my sister and me on a number of vacation trips. When gasoline was rationed, we went by train to places like New York City, Boston, Chicago and Toronto while accompanying our electrical engineer father to his AIEE conferences. While he attended these, Mom would take us to museums and libraries such as The Smithsonian, Henry Ford Museum, The Chicago Museum of Science and Industry, to name a few. When gasoline became available again, we would visit Colonial Williamsburg, Monticello, and many other museums.

Years later, I would repeat these adventures with my four children. It is no surprise that I would support many of these institutions when I could afford to, and participate in their activities and management when retirement provided me the time.

Today, I serve on the board of, or as advisor to: The Museum at MIT, The Dittrick Medical History Center of Case Western Reserve University in Cleveland and The Bakken Library and Museum in Minneapolis, in addition to your AWA board. In recent meetings, all four listed similar strategic agenda items of "the need for additional space." All are exploring off-site storage possibilities. Many have recently added compact storage shelving to increase floor space usage.

All are currently making plans to handle important new contributions to their collec-

tions. MIT has just accepted a gift of 20,000 Polaroid Land artifacts. The Bakken is planning for a gift of 800 antique electrical apparatus items. The Dittrick recently incorporated a gift of thousands of contraceptive devices from a Canadian museum.

AWA is considering several large donations of items not currently held in our collection. Additional artifacts require space for unpacking, inspection, cataloging, exhibition, and storage of items not currently on display. The space must be environmentally friendly for long term preservation.

How do we rate at AWA with regard to "space?" To begin with, we have the space. We managed to pass through a transition period of emptying the annex buildings that we sold to the town of Bloomfield. We did have to temporary rent several large storage container pods to accomplish this.

As I write this, half of the antique vendors have moved out of building #1, which is to become our museum display building. This is allowing the installation of a large overhead door to accommodate construction of the new museum space. The planning and execution of artifact relocation has been superb and our volunteer crew workers are to be congratulated. We are well under way toward accomplishing our dream with your support as we enter an exciting Happy New Year.

ABOUT OUR AUTHORS

DAN MERZ

Measuring the Selectivity of Some 1920s Receivers

Dan grew up on a farm in the Central Valley of California. His exposure to radio began in the 1940s, listening in on a Philco console and later graduating to a Hallicrafters S-38. In those early days, he also built crystal sets

and homebrewed a 5-tube receiver.

He graduated from Stanford in metallurgical engineering in 1961, then spent a year in England, earning a Master's Degree from Sheffield University. Returning to Stanford for further study, Dan received a Doctorate in Materials Science.

On graduating, he spent two years at

FROM THE EDITOR

Coming: A New AWA Publication

I'm very pleased to announce that in a few months we'll be launching a brand new AWA publication. *The Gateway* will be a companion to *The AWA Journal*, but its editorial policy will be quite different. It will be designed to appeal to members and potential members who are new to the hobby and would like to know more about the technical and historical basics.

While the *Journal* is a venue where AWA members write about topics and projects that are near and dear to them (which is part of what gives this publication its diversity and interest), the content of *The Gateway* will be programmed to cover basic information in a systematic and interesting manner.

Like *The AWA Journal*, *The Gateway* will be a quarterly. Its release will alternate with that of the *Journal*, which will continue to be published on its normal schedule. It will be available in electronic form only, free of charge, on our web site at www.antiquewireless.org.

The purpose of *The Gateway* is outreach. We hope it will attract new people to our hobby and, of course, to The Antique Wireless Association. The publication will also be used as an additional vehicle for bringing AWA news to our members. The first *Gateway* will be posted on our site about the middle of this coming February.

Current plans are that the issue will include the first installments of three series:

- "The Receiving Tube Story" (the evolution of the vacuum tube.)
- "Company Chronicles" (biographies of classic radio manufacturers.)
- "Play it Again" (practical procedures for bringing vintage radios back to life).

These series will be updated versions of originals that appeared about 15 years ago in a limited circulation newsletter published by your Editor for new and intermediate hobbyists. Their content should be new to our target demographic as well as to most current members.

Though I plan to supply most or all of the content for the first several issues of *The Gateway*, I am quite interested in involving volunteers interested in contributing material for our target demographic. Specific content "wish lists" will be published in future issues of the *Journal*.

So please review each issue of *The Gateway* as it comes out on antiquewireless.org, feel free to send me your ideas and suggestions, and—most especially—recommend it to your friends and acquaintances who show an interest in your vintage radio activities. Remember, the same web site that offers *The Gateway* also contains both a downloadable membership application and a link to PayPal, where one can become a new member instantly!

—Marc Ellis, N9EWJ

University of California, Berkeley, doing research on high strength steels. After that Dan worked, until his retirement, for Battelle Pacific Northwest Laboratories in Richland, WA. He was involved in plutonium metallurgy and vacuum sputtering of advanced materials.

He has collected and repaired old radios

for about 39 years, and has about 200 in his collection. Included are early battery sets, crystal sets, boatanchors, regenerative short-wave sets, and an assortment of 30s radios.

Dan enjoys attending radio swap meets in Washington and elsewhere; his biggest radio outing was attending the Elgin Radio-fest and touring the Muchow Museum. He

also enjoys exploring the details of circuits and the materials used in restoring old radios. He is a member of the Puget Sound Antique Radio Association in Seattle as well as the AWA.

JOHN BAUMAN, KB7NRN

A 1934 Style Transmitter (In "Transmitters")

Born and raised in Portland, Oregon. John attended Benson Polytech vocational school, majoring in electronics. He has built model airplanes, electric motors and crystal radios. But his favorite project was a VHF TV jammer.

John restored his first antique radio 25 years ago, when he was 25. He began working on antique radios 10 years ago. Whenever the lights in his home would dim, someone would call out "go see what Johnny's doing."

After votech school he worked for an aerospace/defense contractor as an electronics tech. After the recession of the early '80s he moved to the process control field—building and installing controls and telemetry systems.

A little over 20 years ago, John and his oldest son Clayton, who was 9 years old at the time, studied for their Novice license passing both code and written elements. Two weeks later they passed their Technician exams. John has since upgraded to General and hopes to upgrade to Extra class soon.

Clayton, KB7NRK, is now an engineer at Intel. At present John works for a titanium mill as an instrumentation tech.

ERIC P. WENAAS

Photographing Antique Radios: Part 1 — The Basics

Eric P. Wenaas has had a lifelong passion for antique radios beginning with his first Radiola and crystal set given to him by family friends as a young man growing up in Chicago. As a hobby, while in high school, he experimented with radio devices and repaired radios and televisions.

Eric went on to study electrical engineering at Purdue University, graduating with B.S. and M.S. degrees in Electrical Engineering. He then entered the State Univer-

sity of New York at Buffalo, where he earned a Ph.D. degree in Interdisciplinary Studies in the School of Engineering.

After graduating he moved to Southern California, where he first worked at Gulf General Atomic for several years. He then moved to Jaycor, a defense company in Southern California, where he spent most of his career, first as an engineer and later as the President and Chief Executive Officer.

Upon his retirement in 2002, he set out to research the early days of wireless and document interesting historical vignettes based on original documents of the era.

Eric has written articles for the this publication, *AWA Review* and *Antique Radio Classified*. He has recently published a critically acclaimed book, *Radiola: The Golden Age of RCA—1919-1929*, covering the early history of RCAC—including the formative years of the Marconi Telegraph Company of America. For this work, he received the AWA Houck Award for Documentation in 2007. He is a member of the IEEE and the Antique Wireless Association, and is a past member of the American Physical Society. Dr. Wenaas resides in Southern California and continues to enjoy collecting and displaying radios, and researching the early days of wireless.

P.A. KINZIE

Lenzite and the Lenzite Detector

Like many of us, Kinzie became fascinated with all things electrical as a pre-teen. He began serious reading on the subject and acquired an interest in crystal radios that is with him today.

He graduated from the University of Colorado in 1952 with a B.S. in Engineering Physics, then got a job in test engineering at Convair, later a division of General Dynamics, in San Diego. While working full time he enrolled in a night school graduate degree program at UCLA, earning an MS in Engineering in 1959. At Convair, he became responsible for the installation and operation of ground-test instrumentation in support of new aircraft development tests for the Air Force and the Navy. Later this included early development testing for the

(continued on page 9)

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the AWA Journal staff or the Antique Wireless Association.

RCA YOUNG ACHIEVER'S AWARD

For many years the Radio Club of America has sponsored an excellent Scholarship program designed to give financial support to college students pursuing technical careers. Three years ago the Education Committee was formed to give support and encouragement to a different demographic. The Youth Activities arm of the committee seeks out young students in grades 12 and below.



Intent on their soldering are two recipients of the RCA Young Achiever's award. From Lowell (Michigan) High School, both spoke at the Dayton Hamvention Youth Forum.



This young lad is at the mic of the Dresden (Ohio) Elementary Amateur Radio Station. The school recently received a HF rig from AWA/RCA member Roy Wildermuth as well as curriculum materials from RCA.

We have created the RCA Young Achiever's Award, which is presented to high school students or below who have demonstrated excellence and creativity in wireless communications. The recipients are given a special certificate along with a stipend. To date 20 such awards have been awarded to young people across the country.

Eighteen recipients have presented at the Dayton Hamvention Youth Forum; one was a special needs youngster; and one was a 17 year old boy who created a wireless alert system used to warn school personnel of a possible threat.

Seven different schools across the country have received help from us in the form of radio equipment, textbooks, curriculum, or cash to support radio/technology programs.

As head of the RCA educational outreach program, I invite you to contact me and join us in this most worthwhile effort.

CAROLE PERRY

wb2mgp@gmail.com or (718) 668-9347

CANADIAN MUSEUM COULD USE SOME HELP

Some AWA members might have seen the presentation, at the recent AWA convention, about a Canadian museum looking for a new home. It is the Musée Québécois de la Radio, which formerly had a nice space in the city of Sorel-Tracy in Quebec. But after a new city council was elected, the new mayor gave the museum a few months to vacate the premises—which by the way will remain empty until eventually the city finds a use that generates revenue.

Anyone interested in helping our museum find a new home is invited to contact Jacques Hamel, the curator of the Musée Québécois de la Radio, at hamja@videotron.ca. You are also invited to visit

our website at www.sqcra.qc.ca.

Daniel Labelle, President
*Quebec Society For Vintage Radio
Collectors*
dlabelle54@yahoo.ca

O/P BOOK AVAILABLE ON CD

The book *Early Radio Wave Detectors* by Vivian J. Philips is listed as “out of print” as reviewed in the Oct. issue of *The AWA Journal*. However, interested readers can obtain an electronic edition on CD from The Telegraph Museum, Porthcurno, Cornwall TR19 6JX. UK. ISBN 1-9054 19-16-3. Their web address is <http://www.porthcurno.org.uk/>

IVOR HUGHES
Via e-mail

“OOPS” DEPARTMENT

Please correct my address as it appeared in my article, “Regenerative Radio’s Unfinished Business” (July issue.)

It should read 357 Mountain View Rd., Newfoundland, PA 18445; ihchor@aol.com. Also, in Reference #1, the publication date of *Electric Radio #227* is April 2008.

VERNON YEICH
Via e-mail

REHAB RETHINK

This is first, to express appreciation for the Thermidyne circuit schematic drawing in “Radio Rehab 101” (October issue.) It was intriguing—so much so that another analysis was attempted.

Here is the author’s description of the circuit: “I figure the taps on the RF coils allow for loose coupling at the low end of the BC band, while the 0.002 μF blocking capacitors coupled signals better at the top of the band. Note: the second and third RF and the detector stage following are series-tuned.”

A series-tuned circuit produces a minimum impedance at resonance and a minimum voltage. Therefore, it is inappropriate for a coupling circuit between two RF stages. A parallel-tuned resonant circuit produces a maximum impedance and a maximum voltage for the next stage. The following refers to my re-arrangement of the circuit (Figure 1.)

The capacitors C1 and C2 have very small reactances, even at the lowest broadcast band frequency—535 kHz. They are, respectively 148.7 ohms and 33 ohms. Capacitor C1 is an interstage DC-blocking capacitor, and C2 is not necessary.

The parallel-tuned circuit consists of C3 and L2A, which tunes the receiver over the broadcast band. The signal from the previous stage is applied to L2B, which is magnetically coupled to L2A, which has more turns than L2B, thus producing a voltage gain equal to the turns ratio of L2A with respect to L2B. This voltage is then applied to the grid of the following stage.

WALTER LINDENBACH
Calgary, Canada

MARCONI VS FESSENDEN

I’d like to make some corrections to Ken Laurin’s letter in the October 2010 *Journal*, referring to my letter in the July, 2008 issue. I had stated that Marconi officially opened the first commercial transatlantic wireless

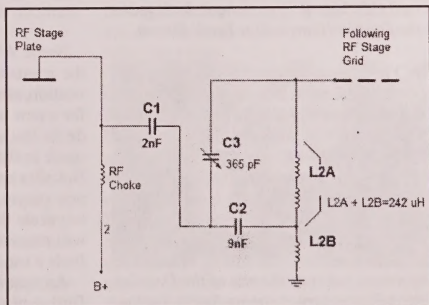


Fig. 1. Thermidyne circuit from *Radio Rehab* column as rearranged by Walt Lindenbach.

service on October 17, 1907, not in 1911 as I was quoted. This was a more-or-less year-round twenty-four hour two-way wireless telegraph service. Whether Fessenden's earlier two-way transatlantic experiments should trump Marconi's operation, as Ken suggests, is a moot point.

However, he certainly was Marconi's closest competitor in this field at the time, at least until his antenna in Scotland blew down and ended his efforts. Fessenden was unable to communicate across the Atlantic in the summer or daytime at 80 kHz. Marconi experienced similar difficulties at about that frequency, but achieved a regular transatlantic service by operating at about one-half of that frequency, employing huge antennas and running powers of hundreds of kilowatts.

HENRY M. BRADFORD
9 Fairfield Street
Wolfville, N. S. B4P1L8
Canada

CAMERA PLANE CORRECTION

The camera plane identified as a B-17 in October's TV column is actually a Twin Beech bombardier trainer. The Army identified this plane AT-18; the

Navy called it an "SNB." I'm enclosing a picture of an SNB (Figure 2.) It is not modified for camera installation, as indicated by the absence of a hole for the camera, but is otherwise the same plane. My guess is that few planes were modified in this way.

JOE SUBSCRIBER
Via e-mail

IT WAS SOMEONE ELSE

Although I was at the Convention, the person identified as me in "Seminar Snapshots" (October issue, p. 25, top left picture) is actually someone else.

RICH MODAFFERI, K2ICO
Via e-mail

If the misidentified person in question would contact me and let me know who he is, I'd be glad to identify him properly in the next issue.—ed

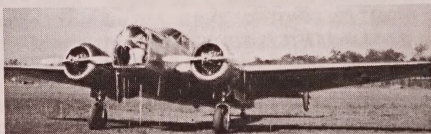


Fig. 2. A Twin Beech bombardier trainer. This one is not modified to carry a TV camera. (U.S. Navy Photo)

AUTHORS, continued from page 6

Atlas ICBM program.

Kinzie continued at Convair until 1962, and then moved to Rocketdyne's Research Department near Los Angeles. Development of the large liquid propellant rocket engines for the Apollo Project was well under way at that time, and he developed sensors and calibration equipment for measuring the high temperature and heat flow conditions produced in the engines. This effort continued until after the first lunar landing in 1969.

During the 1970s Kinzie was employed at two other engineering companies and wrote

a book on thermocouples for temperature measurement (published by John Wiley & Sons in 1973). After 1980, he worked in a non-technical field that gave him more time for crystal radio experiments and his studies of early radio history. He is a long-time member of AWA and a life member of the Arizona Antique Radio Club. He has written for the Arizona Club's newsletter as well as the Xtal Set Society. The latter organization published his book *Crystal Radio: History, Fundamentals, and Design* in 1996.

MEMBERSHIP NEWS



AWA JOURNAL POLICY ON PROMOTING EVENTS: The *AWA Journal* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Send your information to Marc Ellis, Editor, *AWA Journal*, P.O. Box 1306, Evanston, IL 60204-1306. E-mail mfellis@alum.mit.edu. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

Jan 12-13 and 15-16 **May 7**
Linc Cundall Memorial AWA Spring Meet
OT CW Contest

Feb 19-20 **May 7**
AWA AM QSO Party AWA
Membership and
Board Meeting

March 24-26 **August 17-20**
CC-AWA Annual Conference AWA Annual Conference

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

LINC CUNDALL MEMORIAL OLD-TIME CW CONTEST

Jan 12-13 and 15-16

See "Amateur Radio" column in this issue
and www.antiquewireless.org

AWA AM QSO PARTY

February 19-20

See "Amateur Radio" column in this issue
and www.antiquewireless.org

CAROLINAS CHAPTER ANNUAL CONFERENCE

March 24-26

Held at Charlotte, NC. See "With the Chap-
ters" in this issue.

AWA SPRING MEET

May 7

At the Bloomfield Elementary School just
around the corner from the AWA Museum
complex at 6910 Rts. 5 and 20 (intersection
with Rt. 444.) Details in April issue.

AWA MEMBERSHIP AND BOARD MEETING

May 7

To be held at the Media Center (Building 2)
of the AWA Electronic Communication
Museum complex at 6910 Rts. 5 and 20 (in-
tersection with Rt.444.) Details in April
issue.

AWA ANNUAL CONVENTION

August 17-20

Theme: The convention's 50th anniversary.
Watch www.awaconference.com for more
details as they become available.

Recurring Meetings & Events

- Antique Radio Collectors of Ohio—
meets first Tuesday of each month at 2929
Hazelwood Ave., Dayton, OH (4 blocks
east of Shroyer Rd. off Dorothy Lane) at 7
p.m. Also annual swap meet and show.
Membership: \$10.00 per year. For more
info, contact Karl Koogler: mail to above
address; phone (937) 294-8960; e-mail
KARLKRAD@GEMAIR.COM

- California Historical Radio Society—
For info on current meetings, call the
CHRS hotline: (415) 821-9800.

- CARS, the Cincinnati Antique Radio So-
ciety—Meets on the third Wednesday of each
month at Gray's History of Wireless Museum,
which is part of The National Voice of Amer-
ica Museum of Broadcasting, Inc., located in
a building that is now on the National Historic
Register at 8070 Tylersville Road, Westch-
ester, Ohio. 45069. For more information con-
tact Bob Sands at (513) 858-1755.

- Carolinas Chapter of the AWA—Hosts
four "mini-swap-meets" each year (in Janu-
ary, May, July and October) plus an annual
conference, "Spring Meet in the Carolinas,"
on the 4th weekend in March. Executive
committee meets approximately quarterly.
For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence,
W4RON, Chapter President, P.O. Box
3015, Matthews, NC 28106-3015; phone
(704) 289-1166; e-mail [W4RON@car-
olina.rr.com](mailto:W4RON@car-
olina.rr.com).

- Central Ohio Antique Radio Assn.—
Meets at 7:30 p.m., third Wednesday of
each month at Devry Institute of Technol-

ogy, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B.) Contact: Barry Gould (614) 777-8534.

• Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: \$15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

• Houston Vintage Radio Association (HVRA) meets the fourth Saturday (January thru October) at Bayland Park 6400 Bissonnet, 9 a.m. in SW Houston. Each meeting includes an auction and program. Annual two day convention held in February includes three auctions, old equipment contest, technical talks, swap meet, and awards banquet. One day MEGA auctions held in the spring and fall. A newsletter, *The Grid Leak*, is published bi-monthly. Event postings, announcements, photos and other features are available on HVRA web site: www.hvra.org. Membership is \$20/yr. Address: HVRA, PO Box 31276, Houston TX 77231-1276 or call Bill Werzner, 713-721-2242; email: minggi53@sbcglobal.net.

• Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

• Indiana Historical Radio Society—Meets quarterly in Feb., May, Aug. and Oct. Flea market, old equipment contest and auction at all events. The IHRS Bul-

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE



Cost: \$500 (U.S.), \$600 (elsewhere.) Make out your check to Antique Wireless Association and send it to AWA Membership, P.O. Box 421, Bloomfield, NY 14469-0421. E-mail awamembership@rochester.rr.com.

letin has been published quarterly since 1971. For meet details and information about the club and our Indiana Historic Radio Museum in Ligonier, IN. see our website at www.indianahistoricalradio.org, contact Herman Gross, W9ITT, at 1705 Gordon Dr., Kokomo, IN 46902-5977 (765) 459-8308, or email w9itt@sbcglobal.net.

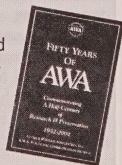
• London Vintage Radio Club—This Ontario, Canada club meets in London on the first Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3IIA, RR#2, Alma, Ontario, Canada N0B1A0. (519) 638-2827. E-mail contact is Nathan Luo at lvrcreditor@yahoo.com.

• Mid-Atlantic Antique Radio Club (MAARC)—Meets monthly, usually on the third Sunday of the month at the Davidsonville Family Recreation Center in Davidsonville, MD. (But meets once or twice a year in Northern Virginia—check web site for schedules, details and maps.) Contacts: President, Geoff Shearer, 14408 Brookmere Dr., Centreville, VA 20120, 703-818-2686 e-mail gshearer@cox.net; Membership Chair, Paul Farmer, 540-987-8759, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

• New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds

50TH ANNIVERSARY COMMEMORATIVE BOOKLET

Our 50th anniversary commemorative booklet *Fifty Years of AWA* has received high marks from everyone who has seen it. We still have a stock of this profusely-illustrated 60-page AWA history available for those who would like extra copies or those who were not members at the time of distribution and didn't receive one. Cost is \$7.00 per copy postpaid, no limit. But once they're gone they're gone—so act now if you are interested! Send your check to Antique Wireless Association, Box 421, Bloomfield, NY 14469-0421.



three annual swap meets. Visit the website, www.njarc.org or contact Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427, pvourtsis@optonline.net.

• Northland Antique Radio Club—hosts four events with swap meets each year (in February, May, September and November) including an annual conference, “Radio Daze,” for two days in mid-May. Annual dues are \$12.00, which includes a subscription to the club’s quarterly newsletter. For more info, visit our web site at www.geocities.com/northland_geo/; contact Ed Rip-

ley at (651) 457-0085; or write NARC, P.O. Box 18362, Minneapolis, MN 55418.

• Northwest Vintage Radio Society—meets the second Saturday of each month at Abernethy Grange Hall, 15745 S. Harley Ave. Oregon City, OR. Meeting starts at 10:00 a.m. Membership \$25.00 per year. Guests welcome at all meetings and functions except board meetings. Spring show, the second Sat. in May. For more information, contact Mike McCrow 503-730-4639; e-mail: tranny53@comcast.net.

• Oklahoma Vintage Radio Collectors—

With the Chapters

Since our first meet in 1979, the Charlotte Antique Radio Conference has grown to become one of the largest antique radio meets in the U.S. In 2010 we had attendees from 26 states and 4 foreign countries.

Among the new things we’re adding for 2011 are cash prizes for major winners in the Old Equipment Contest. “Best of Show” will get \$100 plus an engraved plaque. “Best Restoration,” “Best Presentation” and “Peoples Choice” will each get \$50 plus a gold ribbon.

We’re also adding another meal.

For Thursday evening we’re going to have a soup, sandwich and desert buffet. You can arrive Thursday morning, park your car, and have no need to move it until you head for home Saturday afternoon. Our “Kickoff Luncheon” will be on Thursday morning and our new buffet will be offered that evening. Friday breakfast and lunch will be available on the hotel food cart in the registration tent. The Banquet will be on Friday evening. Breakfast again from the food cart Saturday morning, and finally the Conference Wrap-Up Luncheon will be served early Saturday afternoon.

There will be almost three full days of activities, including our programs/forums on Thursday afternoon and evening, our giant Flea Market on Friday morning, and

our Old Equipment Auction that afternoon. The Flea Market continues on Saturday, when we welcome the public with FREE admission.

Late Saturday morning we’ll have our famous “Radio Rescue” end of meet auction with bargains aplenty. Saturday morning will also include the judging and awarding of prizes for entries in our Old Equipment Contest. Again this year everyone who pays registration for this conference receives a one-year membership in the Carolinas Chapter of the AWA.

Our conference site, the Sheraton Charlotte Airport Hotel, has been acclaimed by many as the finest hotel in the radio-collecting hobby. The staff

at the Sheraton bend over backwards to make sure everything runs as smoothly as possible. You only have to look back to 2009 with its week of heavy rain to see what the folks at the Sheraton will do for us.

WE WILL NOT BE RAINED OUT. In the event of really bad weather, we can and will move the entire Flea Market inside. We look forward to seeing you at the conference on March 24, 25, 26, 2011.

73, RON w4ron

<http://radioheaven.homestead.com/menu.html>

<http://cloughbrenge.homestead.com/>



Meets second Saturday of each month, (except for April, October, and December), at Hometown Buffet, 3900 NW 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/Socializing, 6 p.m., meeting, 7 p.m.

AWA NETS

(EASTERN TIME)

PHONE

SUNDAY:

7237 kHz, SSB, noon (NCS: various);

3837 kHz, AM 4:00 p.m.

(NCSs: KA2J & W2AN)

(Also runs on Sat.—same time)

MONDAY:

*1945 kHz $\pm$, SSB or AM, 8 p.m., (NCS Joe Cro, N3IBX)

TUESDAY:

14274 kHz, SSB, 2:30 p.m. (NCSs: KC3YE and W0FXY)

3837 kHz SSB, 8 p.m. (NCS: WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:

The AWA Bruce Kelley HF Net

3837 kHz $\pm$ kHz, SSB, 9:30 a.m. NCS: Mon. W3JW; Wed. WA2TWS; Fri. W3GMS

**After some 14 months of operation, the AWA Top Band 160 meter net is alive and flourishing. However, the published frequency, 1900 kHz, is running into significant interference problems, and the decision has been made to QSY to 1945 kHz. This is still being evaluated, but seems to work much better. Anyone wishing to check in is advised to listen on 1945, Monday evenings, at 8 p.m. Eastern time. It is an open net, and everyone is welcome.*

CW

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up. First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:00 p.m. (NCS: N2WZS)

Receive 145.110 MHz

Transmit 144.510 MHz

110.9 PL

Swap meets on second Saturday in April and October at 8 a.m., Midwest City Community Center, 100 N. Midwest Blvd., Midwest City, OK. Membership \$15/year including monthly Broadcast News. Info: contact Jim Collings at (405) 755-4139 or jrcradio@cox.net. Website: www.okvrc.org.

- Ottawa Vintage Radio Club—Meets monthly (except June and July) in the Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario, Canada. Contact: Lea Barker at (613) 829-1804 or check www.ovrc.org. Membership: \$10 Canadian/yr.

- The Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea markets, contests and clinics held at least four times yearly. A fall auction is included in September and our annual luncheon program is on the first Saturday in December. An annual Tri-State Radio Fest is held in April. Our journal, *The Pittsburgh Oscillator*, is mailed quarterly. For more information visit us at <http://www.pittantiqueradios.org>, email President Chris Wells at radioactive55man@comcast.net, or phone Treasurer Tom Dixon at 412-343-5326.

- Society for Preservation of Antique Radio Knowledge (SPARK)—Meets monthly at Donato's Pizzeria, 7912 Paragon Rd., Centerville, OH. Annual swap meet. Membership, \$18/year. Write SPARK Inc., P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

- Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TX. Contact: Doug Wright, 625 Rolling Hills Dr., Canyon Lake, TX 78133. e-mail dwjw@gvtc.com; website www.gvtc.com/~edengel/TARC.htm

REGIONAL MEETING REPS

California.....Floyd Paul, W6THU

CanadaTo Be Announced

D.C. AreaPaul Mooney, K4KRE

Indiana.....Herman Gross

New York.....Ronald Roach

Carolinas ChapterRon Lawrence, W4RON

Texas.....David Moore (Houston)

Convention Doings

Fellow AWA members and friends,

As I write this, Christmas is around the corner but when you read this, it will be a New Year with new opportunities and all the excitement of a new season of hamfests, radio meets, conferences and of course the AWA 50th Convention, our Diamond Anniversary. Every anniversary deserves a celebration, and what a celebration this year's will be! We are sometimes a serious bunch but we know how to throw a party, you'll see!

In March, I will be traveling to Charlotte for The CC-AWA Radio Conference. This is an event that embodies the spirit of the AWA and adds the unique flavor of the Carolinas Chapter. At that event I will present our 2011 Convention video. This presentation is becoming a tradition, which I hope to continue. I hope to see you there. I had a great time last year!

For our 2011 Convention, we are keeping the best of last year and adding more. We are continuing our new policy of mailing registrations. Those who attended last year's event will remember that we no longer provide a large envelope of Convention materials but instead return a single ticket. When you arrive in Rochester there is no check-in required. You are ready to go.

We are also continuing our new policy of assigning Flea Market spaces to pre-registrants only. If you do not pre-register, all remaining spaces will be first-come-first-served. Those who pre-register may occupy their spaces as soon as they arrive, but we ask that selling be confined to official flea market hours.

Our very popular pizza dance party and the AWA Cinema Pub will return with a fun new offering this year and plenty of popcorn! Our forums and presentations will again be brand new. Ladies Luncheon continues this year, but not to be outdone, we are adding a special function for the men. And that will be something that you will learn about in March.

Our theme this year is the Convention itself. Our Diamond Jubilee. Fifty years of

celebrating the story of wireless, of promoting and preserving the history of electronic communication, of fellowship and friendship.

Our speaker, our contests, everything we do this year will be a tribute to what others before have accomplished and an attempt to inspire those who will come after us.

One of my favorite books was written by Lee Iaccoca, the creator of the Ford Mustang and 1970s savior of Chrysler. In it he points out that many sales people never get around to asking for the order. They hint and they promote but somehow they fall short of the question. I am not going to make that mistake. I am going to ask you to mark the convention dates on your Calendar. August 17-20, 2011. Our web page, www.awaconference.com, opens this year on April 1 (no fooling!) And on that date you can make your reservation for what I feel will be the most exciting Convention we have ever held.

And please remember that the future of our new museum lies in your hands. Share the information you received from our fund drive with your friends. Tell them about the AWA, about the Museum, about the convention. Most of the large museums have discontinued their wireless exhibits. If we don't act to save our history we are in danger of it being lost to future generations. If you are reading this I know you are interested, I know you care.

Roy Wildermuth W2IT
Chairman, 2011 AWA World
Convention

*50 years, Our History, Our Future
The Spark of Wireless History*

Summary of Minutes AWA Membership Meeting 2010

The meeting was called to order by Director Thomas Peterson, Jr., at 1:27 p.m. on November 7, 2010, at the Max Bodmer Library (Bldg. 2) of the future AWA Museum

complex at 6925 Rte's 5&20, Bloomfield, NY. Present were eighteen officers and trustees and two from the membership.

The minutes of the Nov. 8, 2009 membership meeting were approved with no changes. In general opening comments Peterson noted that the results of the work at the Museum are extra-ordinary, and one can see the results in the volunteerism. The AWA has "turned the page" and is now launching into its next serious stage to develop its considerable resources for completing the Museum's extensive vision and to keep in mind that all members are valuable to the organization.

By proxy vote the membership approved setting the number of trustees at twenty-one (541 for, 17 against and 30 abstaining), and elected Geoffrey Bourne to a three-year term as trustee (571 for, 6 against and 11 abstaining). The Secretary certified that the proxies were mailed in time for reasonable response by the membership.

Deputy Director Robert Hobday submitted the Financial Report of the current fiscal year to date. The recorded loss of \$44,000 related to the building out of the Media Center and necessary staging building, facilities to house the archives of the Radio Club of America, additional storage for the entire removal of all AWA holdings in the former Annex, architectural fees relating to obtaining building permits for the main Museum building and startup of the development campaign. As a cash corporation, the AWA must record these expenditures in the year they occur. The architects report the plans as feasible, to include Museum development, parking and a developed septic system, the latter at a considerable cost savings. Development materials are scheduled for a late November mailing to all present and former members on lists reaching back three years. Organizations will be the next constituencies to contact. The organization's accounting firm has proposed a new fiscal year calendar to begin each October 1.

Richard Neidich, Membership Committee chair presented the report as a slide presentation., which included considerable in-

formation from the membership and the committee's proposals. The *Journal* will continue four times per year. As a result of postage cost increases, a new printing company will process the mailings as non-profit and also send the international mailings. In January, a web based application will be considered to facilitate monthly on-line dues reminders and expansion of on-line dues payments. To save on cost and improve scheduling, proxy ballot mailings will be uncoupled from the *Journal*. The *Review* received many more submissions than it could print in 2010. The remainder will be considered for publication in 2011. Attendance at the 2010 Convention was high but revenues remained modest; the committee's budget can absorb these fluctuations. In future the Convention will return to its regular number of days. A proposed theme for 2011 is "The Next Fifty Years." The *CQ Magazine* touted the AWA Convention as a model to emulate. Goals for 2011 include continuing "wiser" budget management, review of formats for the *Journal* and the *Review*, increased Convention attendance, improved activity coordination, expansion of membership benefits and a planned email news magazine of the organization's activities and events.

The membership meeting adjourned at 3:17 p.m.

Respectfully submitted by

William L. Hopkins, *Secretary*

NOTE: A summary of the AWA Trustees Meeting—Also held on November 7, will appear in the April *Journal*.

AT THE MUSEUM

Visit us on the Internet at <http://www.antiquewireless.org>

MUSEUM MANAGEMENT AND STAFF

Thomas Peterson, Jr.
Director

Robert Hobday, N2EVG
Deputy Director

Bruce Roloson, W2BDR
Curator
Accession Committee Chairman

Ronald Roach, W2FUI
Operations Manager

Lynn Bisha, W2BSN
Associate Curator
Registrar

Felicia Kreuzer, KA2GXL
Assistant Curator

James Kreuzer, N2GHD
Assistant Curator
Media Librarian

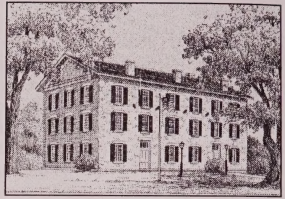
Lauren Peckham
Assistant Curator

Roy Wildermuth, W2IT
Assistant Curator

Ed Gable, K2MP
Curator Emeritus
Historian

Assistant Registrar

Stan Avery, WM3D
Treasurer
Museum Store Manager



MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Museum Curator Bruce D. Roloson, W2BDR, Curator, P.O. Box 478, 2 Walnut Place, Apalachin NY 13732, e-mail broloson@stny.rr.com. The AWA Electronic Communication Museum is an IRS 501(c)3 charitable organization.

From Bruce D. Roloson, W2BDR, Curator

This year-end brings many changes to the Museum complex. With a great deal of effort from our volunteers, the material from the Museum Annex has been moved out and the Annex is empty. Peddler's Antiques, which had been located in what will become our main museum building (Building 1), has moved out and the building is ready for us to start the remodeling. As we turn the year, the excitement of a new museum complex and all it will bring to the organization is in the air.

We attended the RCA (Radio Club of America) meeting in New York City. At the meeting, Dave Bart presented a program of the intertwined history of AWA and RCA. Roy Wildermuth and I presented two awards at the banquet. Roy presented the Barry Goldwater Award and I presented the Harry Houck Awards.

AWA is in the process of building a collection of material connected with Fred M. Link of Link Radio. Fred was the longest serving president of RCA. He was president during the time of Cellular transition. We will have many of his documents and much of his equipment. Thanks to the work of Bob Hobday, we've begun to raise the



funds needed to bring the new museum to life. The *Join the Conversation and Get the Spark* Campaign is under way. When you receive your mailing, remember that we need everyone's support!

This winter we will be sorting and planning for some of the exhibits to be presented at the museum and at the 2011 AWA Convention.

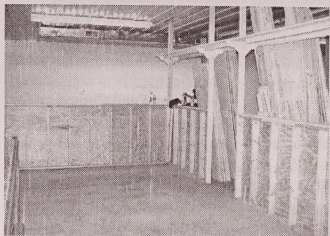
Best wishes for a very Happy New Year from all of us at the AWA Museum!

From Ron Roach (W2FUI) Museum Operations Manager:

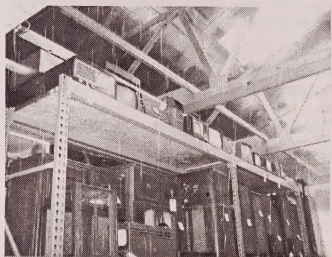
The print archives from the old RCA Harrison, NJ tube plant and those of the Radio Club of America now reside in one of the temperature/humidity controlled bays on the ground floor of the Media/Conference Center (Building 2.) They are housed in lateral file cabinets and open shelving. Scanning of the Radio Club of America archives will shortly commence, adding to AWA's ever-expanding database.

Twenty-eight lateral file cabinets and six fire safes have been placed in the downstairs areas; one bay temporarily houses wood artifacts removed from the Annex until such time as they become a part of the new museum displays.

Taking advantage of an opportunity that arose during late summer, Rhonda Jenner, AWA Property Manager, moved her



Our old Museum Annex building now contains mostly empty space.



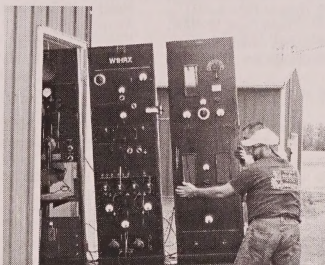
Building 3, the Museum work building, is stuffed to the rafters with items from the Annex.

antiques operation out of Building 1 to another site across the road. This provided an unexpected early access to the future museum. The first modification to Building 1 was completed in December. A seven foot wide steel double-door entry was installed in the southeast corner of the building, facing the first floor entrance to the Media Center.

This facilitated the removal to Building 1 of the remaining contents of the Annex, including disassembled shelving, the last of the items in the tube loft, and some showcases and office furniture. November, at a public hearing of the East Bloomfield Town Board, final approval was granted for expansion of the water line to the Gauss Road facility (Building 3.) This ended a lengthy process that required town, county and state approval. This approval process was strongly supported by the East Bloomfield Town Board. The Ontario County RACES/ARES



Jim Kreuzer (left) and Bruce Roloson pack up the last of the artifacts in the tube room



The James Millen transmitter, our iconic amateur radio rig, being moved to temporary storage on the new museum campus.



Loading a trailer with material being removed for storage.

and Squaw Island Amateur Radio Club chose, for the third year, to hold their holiday get-together at the AWA Media Center. The decision was made because of the many favorable comments from their members.

Work progresses to provide operating positions at the Gauss Road facility for the amateur radio seasonal contests and exchanges. This is supported by the efforts of Lynn Bisha, Duncan Brown, Joe Granica and Roy Wildermuth.

From Bob Hobday, Museum Deputy Director and Chair of the Development Fund Campaign, N2EVG@ARRL.net

On November 24, 2010 an informational mailing was sent to our members announcing the SPARK Development Fund Campaign for launching the exciting new Antique Wireless Museum. The proposed facility is to be opened in 2013. At six million our goal is large, but we have already achieved the first million. Please consider the value of what AWA is accomplishing and support the new Museum effort as generously as possible. Together, we can SPARK the new Antique Wireless Museum.

RECENT MUSEUM DONORS

- ❖ James Empey.....Large collection of late Heath Test Equipment.
- ❖ Thomas Perera, W1TP.....Melehan Valiant bug. Rare.
- ❖ Richard Cook, W9NAH.....Amrad Spark era T/R switch, UE583 tube, RK60s NIB.
- ❖ James Corke, KA2LFN.....Heath SB1400 Xcvr, Yaesu FT-101EE, Yaesu FTV-650 Xvtr.
- ❖ George Hessel, W2IZO.....Early HB TX with VT-127s, Large collection Eimac, Collins B&W and other catalogs, brochures, data sheets, hundreds. Nice.
- ❖ Hiroshi Osanai.....Japanese tubes; 12F, UX12A, several books on Japanese radio and television history.
- ❖ Donald Partis, K2AIV.....Drake R4B and T4XB combination with spare tube set.
- ❖ Richard Sypula.....LCG400 NTSC pattern generator, six Heath items, NIB Futaba 4 servo remote.
- ❖ Ray Foster, KB2UN.....Cush-Craft R-7000 multi-band vertical antenna.
- ❖ Steve Holdsworth.....Ed Holdsworth, N2EH estate collection. 174 listed items. Huge selection of Amateur Multi-mode HF, VHF and UHF transceivers, several NIB. Many VHF and UHF FM Xcvrs base and handheld. Antennas, power supplies, wattmeters, tuners, more.
- ❖ Edward Koenig.....Measurements Corp Intermodulation Distortion Meter, Clough-Bregle Model 111 FM modulator.
- ❖ Linda Sandburg.....Silverstone 7134 radio.
- ❖ Louis Kohnen, K2ANC.....Drake TR-33C transceiver with EM1525 microphone.
- ❖ Roger Cordukes, VK4CD.....87.6 cps tuning fork to align model 15 TTY's.
- ❖ John Cunliff, N2NEP.....400 feet commercial shelving, Harris 26V, 75 Amp power supply, more..
- ❖ Paul Wilson, K2GMZ.....P&H 2-150 Xvtr, Ameco VHF RX converters, 5 Heath items, more.
- ❖ Robert Reifsteck, K2LZG.....Hallicrafters SX-42, SX-62 and T-54A television.
- ❖ Sidney Cordeman, K2CML.....Bell Systems Journals, 1925 to 1951.
- ❖ Lou Agresti, W2OPF.....Freshman G60S Battery Eliminator.
- ❖ Paul Osbourne.....From University of Rochester: National NC-400, GR-1309 AF generator, Keithly 197 DMM, OKI klystrons, more...
- ❖ Robert Kulow, WA2UEH.....Krohn-Hite tunable LPF, Elmer Bucher books, Weston 341 in oak case
- ❖ Mike Baransky.....AN/GRC-142, Teletype triple tape reader.
- ❖ Ronald Boltz, K3TJZ.....TT-4A/TG page printer.
- ❖ Jean Murphy.....WA2QLT estate: HBR-14 receiver, complete 5 coil sets, Atlas 215X Xcvr, Central Electronics 20A Exciter and 600L linear, Viking Ranger II, MFJ 207 SWR analyzer, more..
- ❖ William Vetter.....Very early GE Transistor Manuals.
- ❖ Robert Corbin, N2RSM.....Heath MR-18 Marine receiver.
- ❖ Jay Golden, KC2YST.....MFJ-944 antenna tuner, MFJ 959B RX pre-amp.
- ❖ John Caruso.....Early Link FM equipment, large quantity components.
- ❖ James and Felicia Kreuzer.....The Robert Voss Teletype book Collection of very early domestic and foreign teletype books and literature, over 100 pieces. Nice.
- ❖ Barry Quinn WA2FGW.....7 and 9 pin common RX vacuum tubes.
- ❖ Lindsay Publications.....Several copies each of various vintage radio books.

Compiled by Ed Gable, K2MP, Curator Emeritus

THE VACUUM TUBE

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

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Updating Previous Topics

It's time to supplement previous columns with "new scoop," as fresh discoveries often pop up. Here's an expansion on three topics.

"Export" Tubes

The October 2009 column gave then-existing information on the wacky line of "export" tubes in some late-'30s Philco radios intended for overseas sale. These comprised variants of regular types with an "E" added to the type identifier, amounting to roughly 40 tubes all told. In terms of complexity, they are all tetrodes or above. Most of them have small but mysterious variations in construction. The 6F6EG is an example, a regular 6F6G with the control grid and suppressor grids tied together internally.

The 2009 story reported that no evidence from the '30s had turned up as to use of these tubes by *Canadian* Philco. However, a recently found copy of the Third Canadian Edition of *The Mallory Radio Service Encyclopedia* confirms their involvement. The book is undated but appears to have come out in the late '40s.

It shows 76 late-prewar models that used

an "E" tube in one or more positions: 15 car sets, 17 1.5-volt battery models, a two-volt farm radio, a "three-power" portable, 18 AC-DC designs, and 34 AC home versions. Unlike the U. S. "export" Philcos with their 115/230-volt capability, the AC and AC-DC models seem to have been for 115-volt operation only.

Canadian Philco used 25 "E" types in these sets, ranging from the 1A5EG through the 1232E. The photograph, by courtesy of tube collector-wizard Jim Cross, shows a group of new-in-the-box "E" tubes that he had lately imported—from Canada!

The other setmakers didn't bother with the "E" machination. Zenith had a design philosophy similar to Philco's and exported radios, but used regular tubes. So did the export models of other makers like Midwest, Scott, and RCA.

The Tube-Base Asbestos Scam

In the January 2008 column, we reported on the occurrence of lawsuits in which former electronics technicians claimed that they had contracted lung cancer from asbestos that had somehow escaped from Bakelite tube bases. To state the matter simply, the Bakelite molding compound that was standard for making bases used wood flour as a filler to extend the phenolic resin. The degree of fill was fairly aggressive, comprising about equal parts of flour and resin. There was an asbestos-filled version of Bakelite long ago (in the '20s) but there has been no evidence that it was ever applied in tubes.

Journal management has performed something of a public service by putting the column on the AWA website. Make a Google search on "tube base asbestos," and you'll see sponsored links (presently three) with information on asbestos

(continued on page 31)



A group of new-in-the box export tubes recently acquired in Canada. Courtesy Jim Cross.

KEY AND TELEGRAPH



EDITED BY **JOHN CASALE**, W2NI, 35 PICKERING LN, TROY, NY 12180,
casalejj@yahoo.com PLEASE INCLUDE SASE FOR REPLY. © 2011, J. CASALE

Charles Williams, Jr.

Part Two: The Human Voice Sent Via Telegraph

Probably the most famous of Charles Williams' workers was Thomas Watson. Watson was a son of a Salem Massachusetts livery stable foreman. He had drifted from job to job for four years until July of 1872. Then, at age 18, he was hired by Charles Williams. He started out turning binding posts on a hand lathe for \$5.00 a week.

By 1874, Watson was considered one of the shop's best men (there were about 25 employees working there at that time.) Watson studied the scientific principles behind his work and was educated about electricity by Moses Farmer. He also benefited from a small library of books on electricity, to be read during lunch time, provided by Williams for his employees. that were read during lunch time.



Charles William Jr's home as it appears today. The first practical telephone line in the U.S. was installed between this home and the Williams factory. Courtesy of the Somerville Public Library

Watson was assigned almost exclusively to do custom work for inventors. Early in 1874, while Watson was working on an apparatus of Farmer's, Alexander Graham Bell came into the shop and went directly over to him. Bell was then 27, and a Professor of Vocal Physiology and Elocution at Boston University. He wanted Watson to make modifications to the transmitter and receiver of his harmonic telegraph.

Bell's design was intended to send 6 to 8 messages at different pitches simultaneously over one wire; the messages would then be picked up separately on tuned receivers. By January of 1875, Watson was assigned to do all of Bell's work in addition to the work he was doing for other inventors.

By the spring of 1875, after months of discouraging results with the harmonic telegraph, Bell attempted to cheer up Watson one night by letting him know of another plan. He said to Watson, *If I can get a mechanism which will make a current of electricity vary in its intensity, as the air varies in density when a sound is passing through it, I can telegraph any sound, even the sound of speech.*

Telephone Discovery

In the attic of Williams' shop, on June 2, 1875, Bell and Watson were continuing with their weeks of experiments with tuned transmitters and receivers as a means of sending several simultaneous telegraph messages over a single line. Bell had two stations set up in his room. One station consisted of a number of transmitters (interrupters) with telegraph keys and a second station consisting of receivers

made with horseshoe electromagnets and the corresponding reeds of the transmitters. A third station was set up in Watson's room with a duplicate set of Bell's receivers. All three stations were connected in series.

Each of the transmitters and receivers had a reed, made from a strip of spring steel, positioned over an electromagnet and clamped at one end so that the pitch of its natural vibration could be adjusted by changing the clamping point. The instruments were adjusted to various pitches.

Each transmitter was fitted with a pair of interrupter contacts, similar to those used in an electric bell. When a transmitter was keyed, the steel strip, or reed, would vibrate at its natural pitch and only the corresponding receiver with the matching reed would respond—vibrating at the same pitch.

On this day, when Bell keyed all his transmitters in succession, the corresponding receivers responded with the exception of one in Watson's room. With the transmitters and battery off the circuit, Bell connected the two stations of receivers together in a closed circuit. He then noticed while Watson was trying to pluck the reed free on the non responding receiver, that the reed on his receiver started to vibrate with only some residual magnetism. Bell also noticed he could faintly hear the specific tone of Watson's reed on every one of his receivers.

It was this discovery of a means of producing a varying current that led to Bell's development of the telephone—which is essentially a device for converting voice into a continuously varying electric current and using that to actuate an electromagnet acting against a diaphragm.

5 Exeter Place

In January of 1876, Bell decided to keep his experimental apparatus out of sight until he secured patents, something that was not possible at Williams' shop. He was worried about possible spies for Elisha Gray of the Western Electric Manufacturing Company. Gray was also working in this field.

Bell rented two rooms a half mile away from Williams' shop in the attic of 5 Exeter Place—another Boston location. Bell slept

in one and Watson set up a lab in the other. Most experiments for the next two years were done there until the telephone went into full production.

Watson made modifications to the instruments in Williams' shop and then carried them over to Exeter Place. Williams' men erected an outdoor telephone line between the Williams Shop and Exeter Place soon after the experimental work began at the latter location. It was a No. 12 galvanized wire, a half mile long. The instruments were connected in a single conductor series circuit using ground as the return. The line remained in constant use until it was abandoned in July of 1877. Watson spent hours at night listening to stray currents on this

Western Electric Company,
Successor (at Boston) to CHARLES
WILLIAMS, JR.,
Authorized Manufacturer for
AMERICAN BELL TELEPHONE COMPANY.
Telephone and Telegraphic Apparatus.
109 & 115 Court Street, Boston, Mass.
CHARLES WILLIAMS, JR., Manager.

This January, 1884 ad from The Electrician and Electrical Engineer shows the Williams Factory as part of Western Electric. The buyout had been made in 1882.

line with his primitive receivers.

Bell was granted his telephone patent (Improvement in *Telegraphy*) on March 7, 1876. On March 10, with the addition of a membrane that varied the resistance of a battery powered, liquid transmitter, Bell was able send a complete sentence to Watson's reed receiver between the two rooms at Exeter Place, "Mr. Watson, come here, I want to see you."

In the summer of 1876, Bell decided to exhibit his telephone in the Centennial Exposition at Philadelphia. Watson built a set of instruments at Williams' shop using bronze instead of wood and polished them like mirrors. Because Bell was late in deciding to exhibit them, his telephones were not placed with other electrical instruments but in the educational section.

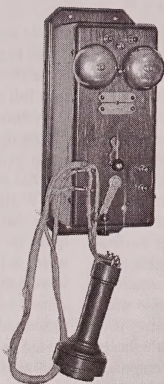
Bell received high marks from Sir William Thompson who stated...*This, perhaps the greatest marvel hitherto achieved by the electric telegraph, has been obtained by appliances of quite a homespun and rudimentary character.*

That summer, two of Bell's supporters, Gardiner G. Hubbard, who later became his father-in-law, and Thomas Sanders, a financial backer and the father of one of Bell's pupils, offered Watson a full time job for the development of the harmonic telegraph and speaking telephone. Urged by Bell, Hubbard offered Watson the same pay he was earning at the Williams shop, free room and board, and a tenth interest in Bell's patents. At that time Watson was earning journeymen's wages of \$3.00 a day and was in line to become a foreman. Watson thought about it for a couple of weeks before signing a contract.

A.G. Bell Co. Formation

Early in 1877, Watson gave Williams the first production order of 25 box and 50 hand telephones. Up until this time, Watson had built all the phones. On April 4, the first private phone line for practical use was installed between the Williams shop and his home in Somerville. One one occasion, Bell observed: *I went into his office this afternoon, and found him talking to his wife by telephone.* The reported success in the press stirred public interest. Inquiries and orders started to pour in and within a month a leasing plan was put into practice.

The first customer was a friend of Williams, Roswell C. Downer. On May 1, 1877, Downer rented two phones that were put on a private line between his State St. office and his home in Somerville. The first paying customer was James Emery who, on May 30, paid Williams 20 dollars for a year lease. Williams carried the sum around in his pocket for awhile until he could ask Gardiner Hubbard what to do with it.



The "Coffin" was probably the most famous telephone Williams produced. A single magneto hand telephone was used as both a receiver and transmitter. Some models came with two, one for each hand. Courtesy of Tom Adams.

At that time, only a "patent association" of Bell, Sanders, Hubbard and Watson existed. On July 9, 1877, the Bell Telephone Company was organized as an unincorporated "voluntary association" without any capitalization. Watson became a superintendent in charge of manufacturing and

Bell was the "Electrician," although Watson also filled this role. A strict policy of leasing instead of selling phones was adopted. On July 8, 1877, Watson dismantled the Exeter Place lab and moved it back to the Williams shop.

Sale to Western Electric

By August 1, 1877, 778 phones were in operation without failure. Williams was manufacturing phones at the rate of 25 a day. That month, Williams promised to increase his production from 25 to 50 daily, although he was incurring significant production expenses. The Bell Company, short of capital, relied heavily on the credit extended by Williams.

The manufacturing arrangement between the patent holders and Williams had been informal to this point. A formal agreement was not drawn up until August 1, 1878, giving Williams exclusive rights of manufacture. It consisted of a three-page hand-written contract. The Bell Telephone Company agreed to purchase all telephones from Williams, paying him \$1.60 for each hand telephone, and \$2.45 for each box telephone. Each was subject to inspection by Watson, the company's superintendent. Williams numbered the instruments in series, the leases were closely monitored, and Watson personally shipped all the instruments.

From 1877 to the spring of 1879 the Bell Company relied exclusively on Williams' shop for telephones and associated apparatus. By early 1879, Williams could not keep up with the demand. Williams' machinists were not used to being strictly production workers, they were considered craftsman, used to making modifications on the fly for inventors. Additionally, Williams stated, *"Almost every batch we turned out was an improvement over the preceding ones..."* By February 7, 1879 Williams' employees were working 11 hours a day but production was up to only 35 phones per day.

The Bell Company began to seek other manufacturers to build the associated telephone equipment, such as call bells and exchange apparatus, to help free up Williams so he could focus on telephones. In the spring of 1879, a newly formed "National" Bell Telephone Company made agreements with four other manufacturers for telephone equipment. These were The Electric Merchandising Co. of Chicago, Davis and Watts of Baltimore, Post and Company of Cincinnati, and the Indianapolis Telephone Company (a recent Bell licensee run by E.T. Gilliland.)

Williams was still the sole producer of receivers and transmitters and was now free to focus on them exclusively, although he did make some apparatus for the New England and New York markets. By the end of the year, Williams invested \$2000.00 on new machinery and increased his work force to 60. His production went to 670 phones a week and by 1880, 1000 per week, but it was still not enough.

During this period Bell faced heavy competition from Western Union. Back in 1877, Gardiner Hubbard offered Western Union Bell's rights for \$100,000, but he was turned down. Western Union decided later to get into the telephone business themselves operating under the patents of Elisha Gray, Thomas Edison, George



The distinctive binding post style used by Williams on his telegraph and early telephone instruments. Thomas Watson began his electrical manufacturing career turning these.

Phelps and others.

A patent infringement suit took place which was settled in November of 1879 in favor of Bell. Western Union had been supplied telephone instruments from the Western Electric Mfg. Co. factories in both Chicago and New York. This settlement put Western Union out of the telephone business and left the Western Electric Mfg. Co. with no telephone work.

Soon after this, the Western Electric Mfg. Company started to develop a relationship with Bell licensee E.T. Gilliland, and in March of 1881 purchased a 61 percent share in his company. This allowed the Western Electric Mfg. Co. a back door re-entry into the telephone business. A proposal was then made for merging the Gilliland Co. and Charles Williams' factory into the Western Electric Mfg. Co., forming a new consolidated firm.

On July 5 1881, Western Union, threatened by a hostile takeover at that time, sold its one-third interest in the Western Electric Manufacturing Company to the American Bell Telephone Co. American Bell had succeeded National Bell in May of 1880 with even greater capitalization. Over the next few months, American Bell was able to obtain a majority control of the Western Electric Mfg. Co.

On a side note, on July 2, 1881 President James A. Garfield was shot in the back while walking through a Washington railroad station. It was suggested that the bullet could be located by some sort of electromagnetic device. Bell and Charles Sumner Tainter, a former machinist of Williams, worked on an induction balance device to help locate the bullet.

Bell's experiments for this were done at Williams' shop in Boston and at a small lab

in Washington. Bell personally tried his apparatus twice on the President but was unsuccessful in locating the bullet. Bell made additional modifications to his device at Williams' shop but the President passed away before he could try it again. Bell's improved apparatus was later widely adopted as a bullet probe before the use of the X-ray.

On July 23, 1881, Charles Williams offered to sell his firm to the American Bell Co for \$120,000 in cash or stock of the consolidated company. A contract was signed on February 6, 1882 along with a complex series of stock transfers.

Out of this the Western Electric Company was formed, receiving permanent and exclusive rights to manufacture telephones and apparatus for American Bell. By April of 1882, Bell owned 53 percent of Western Electric's stock. Williams' now expanded shop on 109 and 115 Court Street became a Western Electric factory, with Charles Williams staying on as its manager.

In 1884, a year after the completion of the consolidation, Williams began to transfer his operations to the Western Electric shops in New York and Chicago. Williams' Court Street factory and what remained in machinery was sold to Albert L. Russell, one of Williams' machinists, who continued there as a manufacturer of telegraph and electrical instruments.

Charles Williams Jr. officially retired in 1886, remaining a director and major stockholder in Western Electric. Williams had a very quiet disposition. He was fond of books and reading and spent several years

in retirement traveling the world and the U.S. with his family until 10 years prior to his death. He passed away in Somerville on April 14, 1908 of bronchial pneumonia.

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This Photo of Philip Boyle in his workshop should have been included with the October Key and Telegraph article "A Coffe 'Vertical' Replica Key--ed.

NEW BOOKS AND LITERATURE



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Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

Cooke and Wheatstone and the Invention of the Electric Telegraph

*By Geoffrey Hubbard. Published 1965 by
Routledge & Kegan Paul, 5½ x 8½ inches,
158 pages, hardcover, out of print.*

Appropriately this book was written by someone who began his career in science and then transferred to administration. I say appropriately for it was Hubbard's main task in the book to explicate the complicated, sometimes antagonistic and bitter, relationship between the essential scientist Charles Wheatstone and the essential practical administrator and technician William Fothergill Cooke. So, just as in telegraphy, there were bound to be some sparks in the Wheatstone and Cooke endeavor. To say the least, they made an unlikely partnership, or to quote Hubbard:

It seems then, that each partner was essential to the other; Wheatstone for his scientific ability and Cooke for his driving force. Their common tragedy was, that though each was likeable in his own way and had many devoted friends, they were mutually antipathetic; the collaboration which enriched their era poisoned their lives.

Hubbard contends that the technological and social situation in the England of the 1830s was so ripe for the invention of the telegraph that if Cooke and Wheatstone hadn't invented it, someone else soon would have. He names Francis Ronalds, Professor Steinheil and Baron Schilling as inventors who were rapidly closing in on the telegraph before Wheatstone and Cooke. But Schilling abruptly quit his telegraph researches, even when he was within grasp of solving his last technological problem. The reason? Schilling had been, to use the quaint 19th century British phrase, "surprised by death."

Cooke's and Wheatstone's first telegraph patent was issued in England in 1837 (signed by no less than King William the Fourth a few days before he died), while Samuel Morse's appeared in the United States just three years later. So Cooke and Wheatstone were the first, but within a few years their complicated five-needle telegraph was supplanted in England by the simpler recording telegraph of Morse.

One can imagine that the aloof Wheatstone could be frustrating to work with. At one point in his work with Cooke he took time off to invent the stereoscope, known in today's form as the child's toy called the View-Master™. Hubbard also credits Wheatstone with invention of the dynamo, the concertina, and one of the three viable forms of the typewriter.

The author expresses gratitude in his book that the telegraph was invented before the telephone. Thus Cooke explained his invention in lengthy letters to his mother (rather than just speed dialing her cell.) Many of those letters still exist, and Hubbard quotes extensively from them. He also used them to advantage when he ventured into explaining the psychology of the Cooke-Wheatstone relationship.

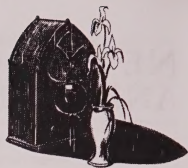
Geoffrey Hubbard was an accomplished writer, astute and careful; it is a pleasure to see him at work. He quotes from another Cooke letter home to Mom: "Did I tell you that Mr. [Isambard Kingdom] Brunel took me in his carriage to Maidstone on Thursday week, to view his railroad and works?" A century-and-a-half later Hubbard succinctly corrected Cooke: "But it must have been to Maidenhead, not Maidstone, that they went" (p. 71.) And he does not shy away from crit-

(continued on page 30)

RECENT RADIO, TV AND ENTERTAINER OBITUARIES

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Note: When known, the date of death is indicated in parenthesis.

JOHN AYLESWORTH, 81, (7-28-10) writer and producer. Canadian-born Aylesworth co-created the television program *Hee Haw* (CBS 1969-1971, syndication 1971-1992) with his partner Frank Peppiatt. Other credits as a writer included: *The Andy Williams Show* (CBS 1959), *Perry Como's Kraft Music Hall* (NBC 1962-1963) and *The Judy Garland Show* (CBS 1964). He and Peppiatt were nominated for Emmy Awards for *The Julie Andrews Hour* (ABC) in 1973 and for *The Sonny and Cher Show* (CBS) in 1976. Aylesworth met Peppiatt while they were working for a Toronto advertising agency. They wrote and performed television comedy skits and created the quiz show *Front Page Challenge* which aired on the Canadian Broadcasting Corporation from 1957 until 1995. Aylesworth began his TV career in 1953 as a writer for the Canadian television show *After Hours* before moving to the United States in 1958 to become a writer for *Your Hit Parade* (CBS).

HIMAN BROWN, 99, (6-4-10) dramatist and producer. Brown created the popular network radio shows *The Adventures of the Thin Man*, *Dick Tracy*, *Grand Central Station*, *Inner Sanctum Mysteries* and *CBS Radio Mystery Theater*. During the 1930s and 1940s he was involved with writing and editing scripts, selling shows to advertisers, and directing actors like Orson Wells, Helen Hayes, Boris Karloff and Peter Lorre. Brown estimated that he produced or participated in over 30,000 shows. He used sound to instantly describe a character or setting and let the listener's imagination do the rest. Brown once wrote, "Radio drama is the most potent form of theater I know. It gives you an experience no other form of theater—movies or televi-

sion—can duplicate. It's the theater of the mind." Brown graduated from law school but was drawn to radio and began his career reading a newspaper column in a Yiddish dialect on WEAH (AM), now WFAN, in New York City. Brown later helped in developing *The Rise of the Goldbergs* which enjoyed a 30 year run on radio and television.

TONY CENNAMO, 76, (6-8-10) radio personality. From 1972 to 1997 Cennamo hosted a jazz program on WBUR (FM) Boston in various time slots. *Boston Globe* jazz critic Bob Blumenthal said his "deep knowledge of the music and broad taste made his programs invaluable resources for listeners." Cennamo was a professional musician, a trombonist, which helped him when he interviewed musicians. After graduating from college he worked for a radio station in Council Bluffs, IA before joining WCBS (AM) in New York City. There he worked in the record library and later did some producing. In 1967 he affiliated with WCAS (AM) in Cambridge, MA hosting a community talk show. Cennamo also taught jazz history and radio programming at Emerson College and other locations. While serving in the U.S. Air Force he formed an integrated jazz group while stationed in Omaha, NE.

JIMMY DEAN, 81, (6-13-10) country singer. Dean will be remembered by many for his 1961 recording of *Big Bad John* and as the creator of a sausage brand. The record quickly went to number one on the Billboard pop chart in 1962 and earned him a Grammy Award for Best Country & Western Recording. Other hits included *The First Thing Ev'ry Morning* (And the Last Thing Ev'ry Night), *Harvest of Sunshine*, *Sweet Misery*, *A Thing Called Love*

and *I.O.U.* On television he starred on *The Jimmy Dean Show* (CBS 1957 & ABC 1963-1966), *Daniel Boone* (NBC 1968-1970) and *J.J. Starbuck* (NBC 1987-1988) and made dozens of guest appearances. Dean also had a supporting role in the film *Diamonds Are Forever* (1971). In 1969 he started The Jimmy Dean Meat Co. with his brother Don. The firm was sold to Consolidated Foods, now Sara Lee Corp., in 1984 for \$15 million. In 1953, after serving in the U.S. Air Force, Dean recorded *Bummin' Around* which launched his career.

MARION T. "PHIL" GAINES, III, 87, (5-23-10) announcer. Gaines was a staff announcer at WRC (AM) in Washington from 1963 until 1979. After leaving the station he became a freelance announcer, narrator and spokesman for businesses and government agencies. He also hosted the classical music program *Music 'til Dawn* on WWDC (FM), now DC101, and worked for the Voice of America. Gaines began his career at WRUF (AM) in Gainesville, FL while he was a college student in the 1940s before joining WMAL (AM & TV) in Washington, DC as a staff announcer in the early 1950s. Later he hosted several local television programs and taught speech classes at George Washington University and American University. During WWII Gaines served in the Army Air Force as a B-24 bomber copilot in the Pacific Theater.

JOHN HENNING, 73, (7-7-10) broadcast journalist. Henning anchored the news desk on WBZ (TV) in Boston from 1982 and until he retired as a Senior Correspondent in 2003 and began broadcasting on WBZ (AM) as a correspondent. While completing his graduate degree he began work as an intern at WGBH (TV) in Boston and in 1964 started reporting for WNAC (TV). He became an anchorman two years later. In 1968 Henning joined WHDH (Channel 5) as anchorman and remained there until the station lost its license on March 18, 1972. It was replaced by WCVB the next day where he continued to work in the same capacity until 1979. He joined a new WHDH (Channel 7) in 1979 and stayed there for two years. Henning was a

dedicated journalist and openly expressed his distress at the state of today's television news reporting. In 1995 Henning joined Denterlein Worldwide, a Boston public relations and public affairs firm, as a Senior Advisor. In 1995 he received the Governor's Award for excellence in news reporting at the annual New England Emmy Awards ceremony.

DENNIS HOPPER, 74, (5-29-10) actor and filmmaker. Hopper co-starred in the film *Easy Rider* (1969) which explored the counterculture of the late 1960s. The film won the prize for best first film at the 1969 Cannes Film Festival. He also helped open the doors for a new generation of young directors including Steven Spielberg and George Lucas. Hopper's career went through periods when he was unemployable because of his behavior and substance abuse. However he made spectacular comebacks and eventually was cured of his alcohol and cocaine dependence. He appeared in over 200 films such as *Giant* (1956), *Apocalypse Now* (1979), *Blue Velvet* (1986), *Hoosiers* (1986) and *Speed* (1994). Hopper was a cast member on television shows including *E-Ring* (NBC 2005-2006), *24* (Fox 2002) and *Crash* (Starz Network 2008-date) and made guest appearances on *Pursuit* (CBS) and *Espionage* (NBC). He began his career at The Old Globe Theater in San Diego and later moved to Hollywood where he got a pivotal role in the 1955 film *Rebel Without a Cause* opposite James Dean.

LENA HORNE, 92, (5-9-10) entertainer. Horne was an electrifying performer who successfully broke color barriers and fought for civil rights all of her life. Horn earned great popularity as a singer at Manhattan's Café Society Downtown in 1941. She began her career as a dancer at the Cotton Club in Harlem in 1934 and then toured and recorded with the Noble Sissle Orchestra (1935-1936) before joining the all-white Charlie Barnet Band in 1937. She was the first black woman to sign a meaningful long-term contract with a film studio, MGM, in 1941. Horn appeared in 22 movies including *Cabin in the Sky* (1943),

Stormy Weather (1943), *Now* (1965), *The Wiz* (1978) and *That's Entertainment III* (1994). She made a number of television appearances and starred on Broadway in *Jamaica* (1957) and *Lena Horne: The Lady and Her Music* (1981). The later show earned her a special Tony Award and two Grammy Awards. Horn sang regularly in leading supper clubs and concert halls around the world.

ART LINKLETTER, 97, (5-26-10) master of ceremonies. Linkletter, a Canadian, kept his audiences laughing with his candid interviews with children (27,000), stunts with adults, quizzes and his adlibbing. He is probably best remembered for his television show *People Are Funny* (NBC 1954-1984). From 1998 to 2000 he contributed to the show *Kids Say the Darndest Things*, originally a segment of *Art Linkletter's House Party*, hosted by Bill Cosby. Linkletter hosted *People Are Funny* on the radio (NBC 1943-1951, CBS 1951-1954, NBC 1954-1960). Other TV highlights included *Life With Linkletter* (ABC 1950-1952), *The Art Linkletter Show* (NBC 1963) and *Hollywood Talent Scouts* (CBS 1965-1966). Linkletter hosted a radio show called *What's Doin' Ladies?* which was carried on the NBC Blue and later ABC West Coast Networks from 1943-1945. He next hosted *House Party* (CBS 1945-1949, ABC 1949, CBS 1950-1957). Linkletter, who was an orphan, began his career on KGB (AM) in San Diego while he was in college during the 1930s. In 2003 he was awarded a Lifetime Achievement Daytime Emmy. He was Chairman of Linkletter Enterprises, wrote over 20 books and lectured on old age.

RUE MCCLANAHAN, 76, (6-3-10) actress. McClanahan was best known for her role as Blanche Devereaux in *The Golden Girls* (NBC 1985-1992). The hit series won two Emmy Awards for best comedy and earned her an Emmy Award as outstanding lead actress in a comedy series in 1986. After the series ended McClanahan appeared in the spin-off, *The Golden Palace* (CBS 1992-1993). Norman Lear selected McClanahan for an appearance on *All in the*

Family (CBS) in 1972 and later for a guest spot on *Maude* (CBS 1972-1978) which grew into a regular role as Vivian Harmon. Other TV credits included *Apple Pie* (ABC 1978), *Mama's Family* (NBC 1983-1985) and *Safe Harbor* (WB 1999-2000). McClanahan made her professional debut in 1957 at the Erie Playhouse in Erie, PA. During the 1960s she appeared on stage in New York City and made her Broadway debut in *Jimmy Shine* starring Dustin Hoffman. In later years she appeared in movies and television productions, lectured on "Aging Gracefully" and campaigned for animal rights.

MITCH MILLER, 99, (7-31-10) conductor and record executive. Miller was an influential record producer and a popular entertainer. He joined Mercury Records in 1948 and in 1950 moved to Columbia Records as their Artist & Repertoire Director. Miller was opposed to rock-and-roll so never signed any rock artists while he was there. This position didn't change until he left Columbia in 1965. Miller helped launch the recording careers of such stars as Tony Bennett, Johnnie Ray, Rosemary Clooney, Johnny Mathis and Patti Page. His Columbia recording of "Sing Along with Mitch" (1958) was the inspiration for his NBC television show (1961-1966) of the same name. He guest-starred on other TV shows, sold more than 20 million recordings of his own, and led sing-along concerts and conducted orchestras around the world. He was classically trained oboist and began his career in the orchestra for George Gershwin's *Porgy and Bess* when it opened on Broadway in 1935.

BENNY POWELL, 80, (6-26-10) trombonist. Powell joined Count Basie's Band in 1951 and performed a riff on their 1955 all-time hit recording of *April in Paris*. The celebrated band played at President John F. Kennedy's inauguration in 1961. He left Basie in 1963 to lead his own ensemble and recorded with the Thad Jones/Mel Lewis Jazz Orchestra and others for the remainder of the 1960s. From time to time he rejoined the Count Basie Band for special occasions including a scene in Mel Brook's 1974 comedy film *Blazing Saddles*. In 1970 Powell

joined *The Merv Griffin Show* and remained with the CBS television talk show for eight years. During this time he also played for session jobs, Broadway musicals and touring shows. Powell began playing with the pianist Randy Weston in the early 1980s and in recent years taught at the New School for Jazz and Contemporary Music in New York City. He began his career in 1944 as a sideman with a number of groups before joining Lionel Hampton's Band in 1948.

ROSA RIO, 107, (5-13-10) organist. Rio became the nation's premier theater organist who successfully transitioned with new technology extending from the silent film era to television. Rio was a staff organist for the NBC radio network from the late 1930s to 1960 and often played for as many as two dozen shows a week. Frequently she had only 60 seconds to dash from one studio to another. Rio also occasionally played for ABC Radio. She provided music for such popular shows as *The Shadow* starring Orson Wells, *The Bob and Ray Show* and many daytime serials. On television her credits included *As the World Turns* and *The Today Show*. During WWII Rio had her own program, *Rosa Rio Rhythms*, which was broadcast to American troops overseas. She began her career in the 1920s playing in movie houses around the country before being hired by the Fox Theater in Brooklyn. In recent years she played the organ for the restored Tampa Theater in Florida opening with her signature song, *Everything's Coming Up Roses*. Rio's final performance was last year.

PAUL ROSEN, 88, (7-20-10) electrical engineer. Rosen and Jack Harrington helped develop the high-speed modem while working at the Massachusetts Institute of Technology's Lincoln Laboratory in 1958. Their invention assisted computer networks nationwide by significantly accelerating the flow of data over phone lines. The invention was an important element in the army's defense project during the Cold War—the Semi-Automatic Ground Environment (SAGE). SAGE collected information from 100 radar installations across the northern boarder of the U.S. Each installation col-

lected data on incoming aircraft which was sent to centers around the country at the rate of more than 1,800 bits per second through modems. Rosen left MIT in 1977 and spent three years as Head of the Defense Communications Agency. He rejoined the Laboratory in 1980 and retired in 1984. Rosen, a U.S. Navy veteran of WWII, was made a Fellow of the IEEE in 1979.

DANIEL SCHORR, 93, (7-23-10) broadcast journalist. Schorr was a Senior News Analyst with National Public Radio (NPR) for the past 25 years. His last broadcast aired on *Weekend Edition* on July 10, 2010. Schorr began his career in 1946 with the *Christian Science Monitor* and remained there until he was recruited by Edward R. Murrow to join CBS in 1953. He left the network in 1976. Schorr spent the next three years lecturing, writing and teaching when he was asked by Ted Turner to be CNN's first news anchor. He stayed with CNN until 1985. Schorr was a strong supporter of the First Amendment and would never compromise his coverage of the news regardless if it upset politicians or network executives. President Richard M. Nixon had him placed on his "enemies list" and President Lyndon B. Johnson called him an "S.O.B." Schorr earned many honors for journalistic excellence, including three Emmy Awards, an Alfred I. DuPont-Columbia University Golden Baton for his lifetime work, and a Peabody Award for "uncompromising reporting of the highest integrity." He served in U.S. Army intelligence during WWII. In 2002 Schorr was inducted into the Hall of Fame of the Society of Professional Journalists.

HELEN WAGNER, 91, (5-1-10) actress and singer. Wagner played the role of Nancy Hughes on the premiere of the soap opera *As the World Turns* beginning on April 2, 1956. Her final performance was on April 5, 2010. Wagner's longevity earned her a place in the Guinness Book of Records for having the longest run in a single role on television. The show ended in September 2010. Earlier she appeared on Broadway in *My Name Is Aquilon*, *Oklahoma!* and *Love of Four Colonels* starring Rex Harrison and Lilli

Palmer. Wagner made her television debut in the role of a queen in a fairytale produced on General Electric's experimental station in Schenectady, NY. Later Wagner starred in live productions of *Studio One*, *Philco Television Playhouse*, *Suspense* and later was a cast member of *The World of Mr. Sweeney* (NBC 1954). In 2004 Wagner received the Lifetime Achievement Award from the National Academy of Television Arts and Sciences.

ILENE WOODS, 81, (7-1-10) singer and actress. Woods provided the speaking and singing voices for the title character in Walt Disney's 1950 animated film *Cinderella*. In 1948 two song writer friends had her record the songs they had written for Disney: *Bib-bidi-Bobbidi-Boo*, *A Dream Is a Wish Your Heart Makes* and *So This Is Love*. When Walt Disney heard the demo recordings he selected her to voice the role of *Cinderella*. Wood was unaware that more than 400 others had auditioned for the part. She next performed on television shows including *The Steve Allen Show*, *The Gary Moore Show* and *Arthur Godfrey and His Friends*. Jacquelyn Ruth Woods began her career at age 11 on a hometown radio station in Portsmouth, NH and by the time she was 15 starred on *The Ilene Woods Show* on the Blue Network Company, Inc., formerly NBC-Blue. She also was on radio programs

with Jack Carson, Jack Benny, Bing Crosby and Bob Hope. In 1985 she launched a new career as a portrait artist with a special interest in painting children's portraits. Woods received a Disney Legends Award in 2003.

Information for this column was obtained from *The Boston Globe*, *The Complete Directory of Prime Time Network and Cable TV Shows 1946-Present* (9th edition), *The Economist*, *The Encyclopedia of Jazz*, *The Hartford Courant*, *The Old Timer's Bulletin*, *On the Air: The Encyclopedia of Old-Time Radio*, as well as:

www.aylesworth.net,
www.imdb.com,
www.latimes.com,
www.legends.disney.go.com,
www.museum.tv,
www.nytimes.com,
www.soapcentral.com,
www.trombone.org,
www.tvjobs.com,
www.variety.com,
www.washingtonpost.com,
and www.wikipedia.org.

The writer wishes to express his appreciation to Ted Hannah, K3CL; Jeffrey Lawrence and Dr. A. David Wunsch for additional source material.

BOOKS, continued from page 25

icizing other primary sources in the book, as when he clearly explains a new patent issued to Cooke and then states that with it Cooke had invented a telegraph that was actually less useful than the one he already had.

Despite all of Cooke's and Wheatstone's disagreements and antipathies, their first practical telegraph was finally installed in 1838 on the Great Western Railroad. Some locals and VIPs were impressed, but the public at large knew little of it or cared little about it. However, interest was greatly boosted when the telegraph was used to catch a murderer, John Tawell, in 1845. The book gives the details in a six-page chapter. History often repeats itself. Sixty-five years later, the public's interest in radio was

greatly increased by the famous use of radio telegraphy to catch another British murderer, Hawley Crippen.¹

It is known that great people, just like us ordinary folks, can be small minded. Europe gave many medals and diplomas to Wheatstone in recognition of his accomplishments. But he refused to accept the Albert Medal offered to him by the Royal Society of Arts. Hubbard explains: "The Society made the mistake of offering the same honour to Cooke..."

Hubbard ends his book on a sad note:

*A hundred years have passed. The telegraph is no more. Nobody remembers William Fothergill Cooke, and Charles Wheatstone is remembered, if at all, for the Bridge which he did not invent.*²

Sic transit gloria mundi. Still, faint—

though clear—echoes of Wheatstone's and Cooke's long-ago struggles with hardware and with each other could be heard as recently as the August 2010 World Convention in West Henrietta, New York as AWA members demonstrated their fists in the hallway of the RIT Inn for any and all who cared to listen.

Telegraph historians and enthusiasts—and those who like good biography—should not overlook this book.

VACUUM TUBE, continued from page 19

hazards, followed by the *Journal* column. For a while, the link sponsors included asbestos-chaser law firms ("contact us and see what size settlement you can get"). Those links have now disappeared. In any event, any paralegal can get access to the column.

A fourth suit turned up recently. In this case the plaintiff, a former mobile-radio technician, claimed that he had been exposed to the bases of tubes on radios he had maintained in the '60s and '70s. The defending law firm invited your columnist to review a stack of tech manuals, obviously obtained at considerable cost, covering 18 or so models of base stations and mobiles from a major manufacturer.

Analyzing the tube lineups was fast and easy. Looking at the tube types represented, the final amplifiers used a gaggle of 2E26s, a smaller number of 6146s, a 5894, an 829B, and a 6897. The lower-level stages and receivers ran on miniature types, with some Loktals in the base stations. A few base stations had 5R4GY rectifiers.

The upshot: most of the tubes did not have bases at all. The 2E26, 6146, and 5R4GY use Micanol (mica-filled) bases, the light tan material. There was no Bakelite present, whether filled with wood, asbestos, or Kryptonite. The suit was settled within a couple of weeks.

Disclaimer: your columnist has had, and has, no financial interest in these proceedings. The effort here is to offer clarity on a confusing matter. One must empathize with the victims of a horrid cancer but justice needs to be supported.

NOTES

1. See <http://www.titanic-whitestarships.com/TheDr.CrippenStory.htm>
2. See http://en.wikipedia.org/wiki/Wheatstone_bridge

ALSO NOTED

Bob Greenlee, *John Logie Baird: The Man Who Invented Television*, Author House, 2010, 384 pages.

More on the UX-210

October's column celebrated the UX-210 power triode and its various progeny. The aforementioned Jim Cross points out that there is some confusion in tube documentation as to the Signal Corps versions of the tube. The VT-25 is a 10Y (i.e., with Micanol base), also carrying the forgotten designation 2C23.

The VT-25A has a slightly different filament rating (the same as the VT-52.) The VT-25A also has a bigger plate than the 10Y and is rated slightly higher on power dissipation. Jim thinks that the VT-25A and VT-52 are the same tube but with different grids.

He also mentions that the deForest Radio Company made "receiving" and "transmitting" versions of the 10: the 410 and 510 respectively. Checking into the matter, the filaments of the two were different, being oxide-coated and thoriated-tungsten respectively. The mount of the 510 was more rugged and offered a higher maximum voltage (500 V unmodulated) than regular "210" types, which were good for 450 volts.

deForest claimed that the 510 was usable "up to and above" 30 MHz, vs. the 8 MHz that RCA recommended for its 210. By contrast, for audio/modulator use, they promoted the 410. Their line of broadcast and police transmitters followed that 510-vs.-410 recommendation.

The column mentions the "10 Special," a low-microphonics version from RCA. Introduced ca. 1934, it was redesignated "1602" in 1937, receiving a new data sheet in the HB-3 handbook.

LENZITE AND THE LENZITE DETECTOR

A number of inventors filed patents for crystal holders and detector stands over a period of years following the early Greenleaf Whittier Picard and Henry H. C. Dunwoody patents of 1906 and 1907. The later inventors usually concentrated on improving methods of establishing and adjusting the active contact on the crystal surface, without limiting the choice of crystal used.

One of the exceptions to this trend was Charles S. Lenz, who filed a patent in the summer of 1914 for a holder assembly and a specific type of crystal [1]. This consisted of the unusual breadboard style arrangement shown in Figure 1, taken from the patent. Important components include crystal holder (1), spring holder (2) and large shunt switch (10) for detector protection when needed.

A detail of the crystal holder is shown enlarged in Fig. 2, where (11) is the contents of the holder, consisting of the crystal, with pressure on it being adjustable by slid-

ing either the spring holder or the crystal holder back and forth in their respective clamps (3), shown in Fig. 1.

Lenz did not describe the physical characteristics of the crystal, although the length of the holder and its contents suggests the use of powder or granules rather than a single piece of material. Lenz specified crystal composition in terms of average values, several samples having been analyzed with widely varying individual compositions. He gave figures of 36 (parts) lead, 18 copper, 11 iron, 13 aluminum, 14 zinc, and 8 of magnesia.

Such an alloy would be highly unusual for a mineral, much less for a crystal detector of any significant sensitivity. His composition is suggestive of a mine assay rather than a full quantitative analysis of mineral contents. Nevertheless, Lenz stated that crystals of that composition were approximately 25% more efficient than any other detector materials, and that they had been obtained from the Arizona Venture Corpo-

ration, from a location in the Cedar Mining District, Mohave County, Arizona. Arizona Venture was a California corporation, with some of its operations in the Cedar Mining District producing silver, but an exceptional case was a location at Deluge WA, where it had been discovered that crystals especially sensitive as detectors could be mined. This had occurred in about 1914, following earlier use of steel galena from at least one of the silver mines for crystal detectors.

xxIn early 1914 the com-

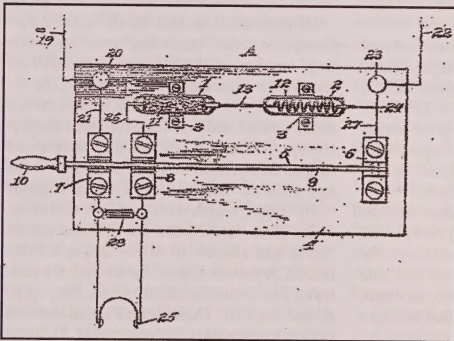


Fig. 1. A unique breadboard style assembly of crystal detector components, from the Charles S. Lenz Patent [1].

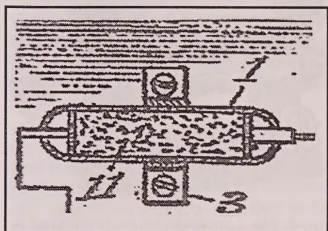


Fig. 2. An enlargement of the crystal holder shown in Fig. 1.

pany began active development of the mine at Deluge for producing the new crystals, two freight car loads of machinery having been received and hauled to Deluge to be put into commission [2]. Associating Arizona Venture with two types of crystal, plus simple confusion in terminology, has led some sources to identify the product as steel galena or galena itself.

However, the best description is from a U.S. Geological Bulletin [3, p. 381], which gives the composition as a mixture of galena, sphalerite, tetrahedrite, and possibly other minerals. According to Alama [4],

quoting from early day issues of the area newspaper, three shipments of these crystals were made between October of 1915 and January, 1916, and the second shipment was worth \$26,000—this for 400 crystals about the size of a marble.

That was a remarkable valuation, and it can be speculated that it was an inflated one produced by a company press release. Nevertheless, it is known that there was sufficient mineral value to prompt Charles H. Wegener, Secretary-Treasurer for Arizona Venture, plus four California businessmen, to organize a California Corporation in May of 1916 to manufacture crystal detectors using Deluge, WA crystals [5].

Charles Lenz did not assign his invention to the new corporation prior to the issue of his patent, nor did he appear as one of its officers. But there was almost certainly an agreement reached between the two parties that included coining the trade name of Lenzite, as well as including it in the corporate name.

The company began advertising the "Lenzite Wireless Detector" at least as early as December 1916 [6], giving its address as 537 Chamber of Commerce Bldg.,



LENZITE CRYSTAL DETECTOR

Patented May 2nd, 1916

A first class Wireless Detector is half the battle in the wireless game. Have you tried the best and most effective, The "Lenzite" Crystal Detector?

Why Is Our Detector Near Perfection?

Being a user of an Audion Bulb and having firmly, after due test and consideration of "mineral detectors," discarded them as unstable and unreliable and very inconvenient, being hard to keep in adjustment, I was very skeptical as to Lenzite, but glad to make the test and more than pleased that I did so.

I found that the reception of signals with Lenzite as a detector quite beyond any hopes that I may have had.

Inasmuch as the mineral in question (Lenzite) seems to be "sensitive" nearly all over its surface on all sides, which is a very great advantage as it makes it almost as easy to keep in adjustment as an audion, and brings in the signals when proper attunement is accomplished, in a very loud and positive manner, and I must add I was greatly surprised as it, without any question, has given me far greater results than any other sort of mineral detector I have tried, and I have tried to get all that I have been able to hear of.

Its clear, loud, readable demonstrations should make it very desirable to operators whether or not they use audions, which consume power which Lenzite does not, and it is quite as good for long distance work as well. I shall be glad to tell others of it.

Very truly,
HERBERT W. BRISCOE.
(6 IH U. S. License.)



Send money order, express order or check for \$5.00 and we will send you, postage prepaid, one of our Lenzite wireless detectors.

LENZITE CRYSTAL CORPORATION

537 Chamber of Commerce Building
Pasadena, California

Fig. 3. Lenzite Ad From the April, 1917 Electrical Experimenter.

Pasadena, which was next to Arizona Venture's home office in Room 535. Advertising appeared in several magazines for some months in 1917. An example from the April, 1917 *Electrical Experimenter* is shown as Fig. 3.

In later ads the detector name was shortened to "Lenzite Detector." An illustration from one of these [7] is shown in Fig. 4. The design illustrated in Fig. 3 and Fig. 4 is quite different from the corresponding holder shown in the Lenzite patent. The contents of the latter are replaced with a crystal cluster at the left end and a long cat-whisker running the length of the tube.

The purpose of the left-side knob of Fig. 4 is not evident, but the large knob at the right on both figures appears to have allowed adjustment back and forth by means of the shaft to which it is attached. Perhaps rotation was also possible. Although this version of the detector was quite different from the original design, the company evidently depended on the corresponding patent to discourage competition.

This statement is based on a patent date of May 2, 1916 shown in [6] (the issue date for the Lenz patent) plus the fact that other patents applicable to the detector have not been located. No other information originating from the Company has been found, but a textbook by Morecroft, Pinto, and Curry [8] gives a discussion of Lenzite, showing two characteristic curves for a sample crystal at high and low sensitivity point contacts.

The curves were said to be typical of those in the category that needed no bias to increase sensitivity. As for the claim of high sensitivity made by Lenz in his patent description, it seems he had some justification. Sensitivity was important to amateurs and experimenters in discussing overall performance, so it is relevant that that the initial Lenzite advertisement in the American Radio Relay League (ARRL) magazine *QST* [6] included an ARRL endorsement that the detector was "... all that is desired of a contact crystal detector."

It is noteworthy that *QST* was at that time publishing such ads after testing the prod-

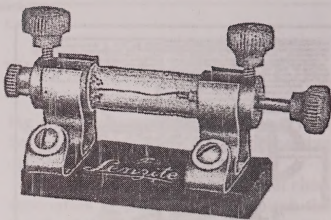


Fig. 4. The Lenzite detector, as pictured in a Wireless Age advertisement [7].

uct at the ARRL station. Additionally, the same Lenzite entry contained a statement by *QST* editor C. D. Tuska (later the owner of the C. D. Tuska Company, well known for its early day radios) where he remarked that it was the best contact crystal detector he had ever tried. Although testimonials abounded in early advertising just as they do today, these can be considered especially significant.

No Lenzite advertising has been found following the 1916-1918 period, and the company may have become inactive by the end of 1918, at least in part because of two important events that took place during that time. The first of these was the entry of the United States into World War I in April of 1917, which immediately affected the radio industry. Those companies that secured government contracts for military products had the opportunity to flourish, but the companies that did not participate in the war effort typically suffered declining sales. This was particularly true of amateur-oriented enterprises. In fact, advertising directed toward amateurs declined so much that this was one of the reasons *QST* suspended publication in September of 1917 for the duration of the war.

The second important event was purely a local one, but it may have had a pronounced effect on the operation of the Lenzite Crystal Corporation. This consisted of a reorganization of the Arizona Venture Corporation, as the supplier of Lenzite, in 1918. Earlier, a mining industry publication [9] had commented negatively about Arizona

Venture claims for future prospects, and then the new company president made a statement that management now disclaimed responsibility for the exaggerated claims of the former president [10].

This was followed by still another reorganization and a new company name: Waldron Mining Corporation, in 1918, with industry news commentary that the commercial value of its property remained to be proved [11]. Later industry news about Waldron gave no updates on operations at Deluge, simply referring to earlier mention about Lenzite as its mining product.

All of this suggests that few if any continuing sales of Lenzite were being made, probably because Lenzite Crystal Corporation's source of supply had been cut off. In fact, by 1925 Waldron Mining itself was defunct [12]. The Lenzite company was evidently long out of business by the time crystal sets made a brief comeback among broadcast radio listeners in the early 1920s, but its short period of earlier activity was enough to influence both the mining industry and radio.

Useful Minerals of the United States [3, pp. 25, 381], the source quoted earlier regarding the composition of Lenzite, also included it in a minerals list, and various mining publications referred to the Deluge, WA operation along with the other Arizona Venture Corporation activities.

The Principles Underlying Radio Communication, a Bureau of Standards publication [13] mentioned Lenzite along with other crystals used for detectors. Finally, it remained for years on a list of 27 trade names and miscellaneous designations in a publication by Elmer G. Osterhoudt, of Modern Radio Laboratories fame [14].

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AMATEUR RADIO

EDITED BY TIM WALKER, W1GIG, 19 WOODSIDE AVE., WESTPORT, CT 06880,
W1GIG@ATT.NET, PLEASE INCLUDE SASE FOR REPLY.



Upcoming Events

Note: Beginning with this issue, the Journal will be mailed at Non-Profit Rate rather than First Class. This will result in a considerable cost savings, but our publication will take longer to get to you. As a result, you will not be receiving this in time for the Cundall event. However, full contest details were posted well in advance on our website: www.antiquewireless.org.

Greetings, by the time you read this the new year will be upon us and our contests will be in full swing. It seems a bit strange to be writing this at the end of October, but I will be away for most of November and we must meet publication dates.

Even though I have been your columnist for only a couple of years, it is now time for me to retire while I still can. I had a couple of significant medical problems this year and I am going to take my doctor's advice and slow down a bit. I would very much appreciate one of you stepping up to the plate and becoming the focal point for amateur activities. I can guarantee you that it is a labor of love with NO pay working for a wonderful organization. We need as many active members as we can find as there are jobs for all.

In the previous Amateur Radio column, Journal Editor Marc Ellis mentioned that he would like to explore the possibility of starting up a Midwest AWA SSB Net. Interested parties were invited to contact him. However he received only one response, so it seems that this is not an idea whose time has come!

It has been a real pleasure holding this position and I wish you all good times for many years to come. See you on the air!

73, Tim

2011 Link Cundall Memorial CW Contest

Dates: Wed. Jan. 12 @ 2300 GMT to

Thu. Jan. 13 @ 2300 GMT and Sat. Jan. 15 @ 2300 GMT to Sun. Jan 16 @ 2300 GMT

Bands: 160, 80 and 40 meters

Special Conditions: Contest designed to favor those using low power and equipment constructed earlier than 1950 (or recently built to the typical designs of that era). But, all are welcome. High scorers should send in full details on equipment and station photos. Plaques to be awarded.

All radio amateurs may participate and submit logs and all are eligible for an award. Non-member stations using pre-1950 type gear count. All stations must submit logs to be eligible for an award and are encouraged to send a shack JPEG showing their vintage station. Electronic format such as EXCEL™ or (PDF, JPEG) scans via e-mail are accepted. Use the format posted on the AWA site.

Logs/photos to be submitted to:

Mike Murphy

38 North Reading St.

Manchester, NH 03104

mjmurphy45@comcast.net

Objective: Contact the greatest number of AWA members or participating stations using pre-1950 gear. When calling use "AWA AWA de WA3FFC" for example. On contact, exchange signal report, year of equipment such as "TX36" for a 1936 transmitter and "RX 34" for a 1934 receiver. Send "MOD" for modern (after 1950) gear. And finally send your Input Power such as "10W."

Frequencies: 1800-1820, 3550-3580, 7030-7050, and 14060-14070 kHz ± QRM. Concentrate 20 and 160 meter contacts on the hour.

Scoring: QSO Zones: "E" eastern zone U.S. districts 1, 2, 3, 4, 8, 9 plus VE1, VE2 & VE3; "W" western zone, U.S. districts 5, 6, 7, 0 plus VE4, VE5, VE6 & VE7. "DX" zone: all others.

QSO Points per Contact by Zone:

"E" to "E" or "W" to "W"	1 point
"E" to "W" or "W" to "E"	2 points
"E", "W" or "DX" to "DX"	3 points

Equipment Multipliers

MOD TX and RX	1
OT TX or RX	2
OT TX and RX	3

Power Multiplier

0 – 4.9 watts	4
5 – 75 watts	3
75 – 150 watts	2
150 + watts	1

Examples

- W1ZB contacts KB0ROB
- This is an E to W for 2 points.
- W1ZB Stn. Jones P-P at 4 watts, R390A One OT, 1 MOD for 2 points.
- Power multiplier is 3
- $2 \times 2 \times 4 = 16$ points
- VE3XZ contacts K3SEW
- This is an E to E for 1 point.
- VE3XZ Stn. Millen, 18W TX, 6J7 Regen RX (both OT) for 3 points.
- Power multiplier is 3
- $1 \times 3 \times 3 = 9$ points
- K4JYS contacts W7LNG
- This is an E to W for 2 points.
- K4JYS Stn. ARC-5's TX, RX (both OT) for 3 points.
- Power multiplier is 3
- $2 \times 3 \times 3 = 18$ points

Your QSO points $\times$ your equipment multiplier $\times$ your power multiplier = total points for the contact. Score totals will be published in *The AWA Journal*.

2011 AM QSO Party

It's time once again to power up those tube and solid state rigs for the fourth annual AWA AM QSO Party. For a 24 hour period each February enthusiasts everywhere are encouraged to put their favorite rigs on the air and share their passion for the AM mode. Whether you work the whole QSO Party or just make a contact or two, you won't want to miss out on this event that has become a yearly favorite of the AM ham radio community!

The rules remain unchanged this year,

and we hope to be able to award extra points for working anchor stations. W2AN and W1HRX have been anchor stations in the past, but as of this writing they are not available and we do not have replacements. The anchor stations will be announced on line (go to www.antiquewireless.org and click on "Upcoming Amateur Radio Events") if we are successful.

Dates and Times: The QSO Party starts at 6 p.m. EST (23:00 UTC) on Saturday, February 19 and ends at 6 p.m. EST (23:00 UTC) on Sunday, February 20, 2009.

Objective: To promote and encourage the use of AM as a mode of operation in ham radio, and to have fun!

Frequencies: 3.835-3.890 MHz, 7.280-7.295 MHz and 14.275-14.295 MHz.

Exchange: Name and state or province (or country if you're outside of North America.) That's it! Of course we encourage participants to talk about the transmitters and receivers they're using, antennas, microphones, etc. Take your time and enjoy showing off that station of yours!

Scoring and Classifications: For stations running 100 watts or less carrier OUTPUT each contact counts 2 points. For stations running over 100 watts carrier output each contact counts 1 point. All contacts made on 20 meters, no matter the power class, count 5 points. You may contact each station once per band. See extra points for flagship station contacts below.

Flagship Stations: The flagship station scores (if we are able to arrange for flagship stations) will not be included in the final points standings. Their totals will be listed apart from the other QSO Party stations. If you are lucky enough to contact a flagship station, your first QSO with it counts as a 10 point contact, but any subsequent QSOs on other bands are at the standard point count for your particular power category.

If we are able to arrange for two flagship stations and you're fortunate enough to pull off a "grand slam" by making contact with both, that will give you an extra 20 points!

Logs: We will have a summary sheet on the AWA website available for download

(continued on page 41)

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
CUTCHOGUE, NY 11935 PLEASE INCLUDE SASE FOR REPLY.



Demonstrating Electronic TV in 1933

Introduction

In early 1929, David Sarnoff, executive vice president of RCA, arranged with Westinghouse to have Vladimir Zworykin "go full speed ahead" on electronic TV development. Zworykin had suggested that it would take about two years to develop a workable system (1.) In February of 1933, Zworykin's team, now located at RCA's engineering facility in Camden, New Jersey, demonstrated such a system. Earlier this year, I was able to locate, at the Hagley Museum and Library, Wilmington, DE, the report that details this demonstration (2.) The report opens as follows:

"The purpose of the demonstration this afternoon (in February 1933) is to present

a television system producing a picture which, we hope, you will find a distinct improvement over the best picture we were able to produce during 1932."

Pickup and Transmitter

The demonstration involved a newly-developed iconoscope camera incorporating 243-line, 30-frame interlaced scanning (3.) Synchronizing impulses were provided by a rotating aperture disc and photocell arrangement. A companion CRT receiver was also developed for the demonstration. (The previous year's demonstration had utilized a 120-line, 24-frame "Nipkow" scanning disc camera and an electronic receiver. Incidentally, this 120-line set was the subject of an article by Jeff Lendaro [4].)

The single-sided "spherical" iconoscope tube was incorporated into studio, outdoor and film cameras. The studio camera (Figure 1) was equipped with a 180 mm, f: 2.9 lens, at its maximum aperture. Illumination was intense: 10 kW overhead banks, a vertical bank of 5 kW as well as four 400-watt spots!

The resultant illumination was measured at 1200 foot-candles. It must have been really tough on the actors! The film camera used a 900-watt arc projector.

A complex arrangement allowed the projection of the 24 frames per second film so as to produce a 30 frame per second video image in the film camera. Such a system, developed in 1932, is still used today!

When switching between cameras, deflection signals and power were disconnected from the unused iconoscope. A 'keystone' signal was applied to correct the scanning pattern since the iconoscope mosaic was tilted with respect to the electron gun. A similar arrangement is now used

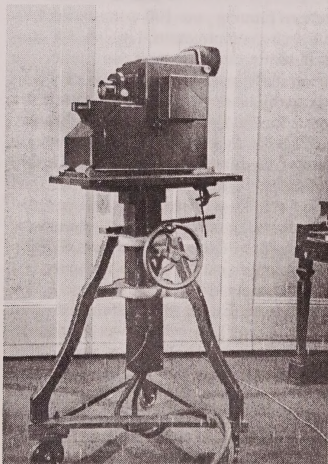


Fig. 1. The studio camera used in the demonstration.

with video projectors when the screen is not perpendicular to the projected beam.

The hand-drawn circuit diagram shows the iconoscope signal directly coupled to the grid of a type 57 pentode and RC coupled to a second 57 (Figure 2.) Strangely, a close-up view of the camera shows three tubes (Figure 3.) Also, note what I believe is a mirror at the top of the photo, giving the operator an inverted view of the optical image focused on the iconoscope mosaic. This would seem to be the case since a viewfinder is shown on the top rear of the camera.

The output signal was routed from the camera to the main control room with a spe-

cially constructed low-capacity cable. There, "B" and "C" amplifiers, having three and four type 57s respectively, further amplify the signal.

Various extraneous signals and “shading” errors are compensated by introducing special blanking impulses, as well as horizontal, and vertical sawtooth signals. Finally a phase-corrected 60 Hz sine wave is introduced in order to correct a top-bright image! In spite of all the above corrections, shading remained a serious issue according to the report.

Finally, a line amplifier incorporating a 57 and 59, was followed by five 59s in parallel. This provided a very low impedance output which was fed, via a 1500 foot cable, from Building 7 at the Camden, NJ facility to the transmitter at Building 2. There, the crystal-controlled transmitter consisted of 210s followed by 852s, 831s, and 846 final amplifier tubes. The modulator tubes were parallel 848s. The carrier frequency was about 50 MHz.

The Receiver

RCA engineers completed "Television Receiver Sample #9" during January of 1933 (Figures 4, 5.) It was a superhet with picture

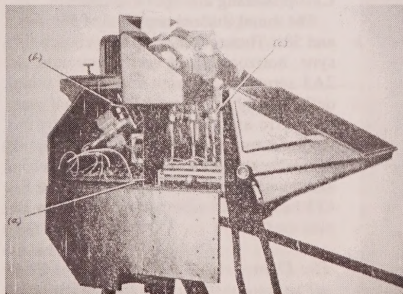


Fig. 3. Interior of the studio camera.

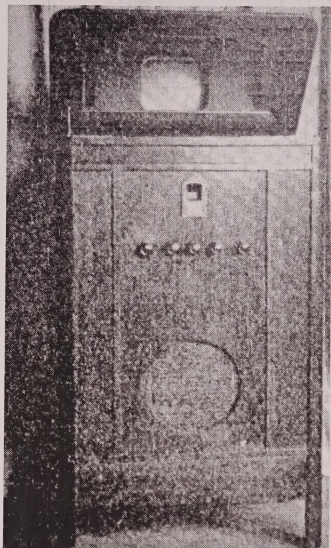


Fig. 6. Street scene from 2nd floor of Building 7 as transmitted.

and sound carriers and capable of being tuned from 40 to 80 MHz with one control. Again, the report makes it clear that:

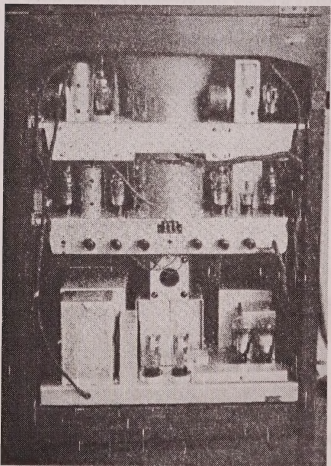
"The picture produced by this receiver is made up of 243 lines reproduced 30 times per second. The actual vertical scanning frequency is 60 per second, and 121 1/2 horizontal lines are produced during each vertical scanning cycle. Thus, the horizontal lines are interlaced..."

The signal was picked up by an 'open V' antenna and input to the 57 mixer. (RF amplifiers apparently were not used until the famous postwar 621.) A type 56 was used as oscillator. Two type 57s and three 58s were IF amplifiers; the latter being AGC controlled from a "special" 2B7. A 57 detector was RC coupled to a 58 and then to a 56 and on to the grid of a type C-739 9-inch CRT producing a 7" by 5 3/8" picture.

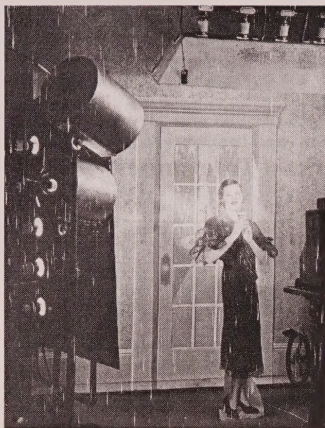
The sound channel consisted of 56s, 57s, and 58s. Those tubes were also chosen for sync, horizontal, and vertical circuits. A 2A3 served as horizontal output, driving deflection plates. Vertical deflection was magnetic as was horizontal centering. Audio output was provided by push-pull 45s. Low voltage was supplied by two 83s and the 4600 volt second anode by two R-613 tubes. Total tube complement was 33 plus the CRT.

The Demonstration Program

The demonstration began with a 7-minute scanning disc program relayed from the Empire State Building to remind view-



Figs. 4 and 5. Front and rear views of the 243-line receiver.



Figs. 7 and 8. Mrs. Ruth Trainer in the studio and as transmitted.

ers how crude the previous year's transmission appeared. Then followed an 8-minute program originating in the Building 7 studio consisted of a violin-piano duet followed by a harmonica selection.

A third portion of the demonstration originated at Building 53 (sent by radio link to Building 7) and consisted of outdoor scenes: street corner (Figure 6) showing traffic, pedestrians, and a *staged auto wreck!* Then a 20-minute film program, originating in Building 7, showed a Grantland Rice Sportlight and an animated cartoon. Finally, two engineer's wives, Mrs. Ruth Trainer (Figures 7, 8) and Mrs. Katherine Bedford were featured in an 8-minute vocal/piano piece.

AMATEUR RADIO, *cont. from page 37*

that you can fill out with all the pertinent information and your final point total. Even if you only make a contact or two please send in a report so your participation in the AM QSO Party can be counted. For those without web access just send a business size SASE and we will send you a copy of it. All summary sheets must be postmarked no later than March 28 and sent to one of the

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1. *Television and David Sarnoff*, E.E. Bucher
2. RCA Victor Company Engineering Department Report, TR-208C, R.S.Holmes 5/24/33. (Courtesy of the Hagley Museum and Library.)
3. We have a mystery here, since "An Experimental Television System" by E. W. Engstrom, in *Proceedings of the Institute of Radio Engineers*, November 1934, Volume 22, Number 11, explains that the early 1933 system utilized "...240-line progressive scanning, 24 frames per second."
4. "The 1932 Field Test TV Receiver," Jeff Lendaro, *Radio Age*, April 1995.

following addresses:

lbisha@rochester.rr.com or

AM QSO Party

c/o Lynn Bisha, W2BSN

83 Parkwood Ln., Penfield NY 14526.

Logs must be received no later than March 20th 2011.

Results: The results for the AM QSO Party will of course be published in *The AWA Journal*. They will also be published in *Electric Radio* and also online at Amfone. net.

RADIO RAMBLINGS

BY **WALTER LINDENBACH**, C/O CCL INVESTMENTS LTD., BOX 75020,
WESTHILLS RPO, CALGARY, AB. CANADA, T3H 3M1—PLEASE INCLUDE SASE FOR REPLY.
E-MAIL: lindenbachw@shaw.ca

Putting Together an AM Broadcast Transmitter—Part 2

Last time, we looked at an inductor and a capacitor of the type used in a tuning network for coupling a transmission line to an antenna tower. The purpose is to (1) match the tower resistive component to the transmission line, (2) cancel the tower reactive component, and (3) adjust the tower current phase to produce the desired radiation pattern.

Tower Phase Angles

The (a) part of Figure 1 shows the overall layout. The circled Xs show tower placement. The distances between them and to the transmitter building are indicated in degrees of wavelength at the operating frequency. The towers are indicated at 125° apart which, at 1000 kHz, is 341.8 feet.

The numbers in partial brackets at the tower symbols indicate the tower current phase. Since Tower 1 is designated 0° , it is the reference tower, and the other tower angles (-40° for No. 2, $+120^\circ$ for No. 3) are angle differences from Tower No. 1.

The (b) part of Figure 1 shows the angular contributions of the components of the antenna system which are shown in part (c). At first glance, they will not seem to fit part (a) of Figure 1 but, if you add up the contributions of each part, the result will be the angle differences from Tower 1.

For example, the current angle in Tower 1 will be -90° from the first L-network, -290° from the transmission line, and -116° from the second L-network. So, the current in Tower 1 lags the power division network at the transmitter by 496° . The current in Tower 2 lags the power division network current by $-90^\circ - 158^\circ + 72^\circ$, which

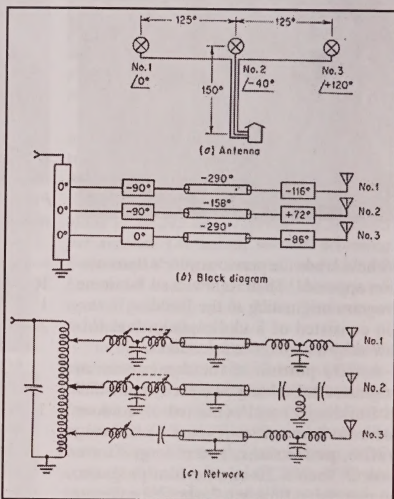


Fig. 1. Tuning/phasing networks (Ref. 1).

is -176° .

So, we can say that the current in Tower 2 leads the current in Tower 1 by $496^\circ - 176^\circ$ or 320° . You might be getting by dizzy now, but if you subtract 360° , a full circle, from 320° , the difference is -40° , and that is the current angle difference between Tower 1 and Tower 2! Neat, huh?

The same arithmetic is applied to the current lags produced by the networks and transmission line on the way to Tower 3. It's just simple arithmetic, but maybe we have enough numbers for now. Simple or not, usually some aspirins are needed before one gets through this part of the planning.

The transmitter building is placed farther

away — 150° or 410 feet — to reduce the antenna radiation into the building. There is much shielding and grounding in the transmitter building to keep RF radiation out of the speech input and measurement equipment. If it does get into this equipment, the program can sound awful, and measurements can be way off.

Energy Into Space

Now, Figures 2 and 3 will show us what the radiation from the towers would look like if it were visible.

Figure 2 shows us the reason for the ground radial array that we discussed last time. The “circuit” for the tower current (as an electric wave) includes an area of ground around the tower. So unless we do something about it, the circuit will include the resistance of the ground. Ground resistance is such that very much of the transmitter power will be dissipated in a circle of ground of one-quarter wavelength around the tower base. This is the area where the current intensity is very high. So, to stop this dissipation, ground radial wires are placed around the tower at 3° intervals.

Figure 3 shows the electric wave radiation from a vertical tower. The loops are traveling away from the tower at the speed of light but, if you were standing near the tower and could see them, you would not see loops; you would see vertically polarized waves that would stand still but whose polarity reversed every half-cycle at the frequency of the carrier. What does a phenomenon like that look like? Damfino!

Peripheral Phenomena

But you can sure enough see the results, and feel it! Once, a consulting engineer came into the main tower hut at the station at which I was working and, to check the tuning, he pushed a wide-blade screwdriver between two turns of one of the tuning inductors. Guess what happened. There was a shower of sparks!

One turn of 3/8" copper tubing shorted and — sparks! Why did he do that? Well, since the antenna current meter went down a bit, he concluded that the network was adjusted cor-

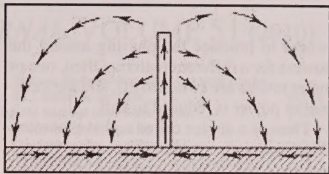


Fig. 2. Current distribution around a vertical tower (Ref. 2).

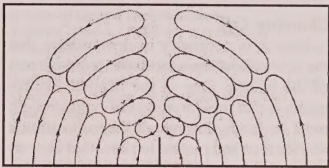


Fig. 3. Electric wave radiation (Ref. 3).

rectly. If the antenna current meter had gone up, it would indicate that that inductor should be larger, and the tap would be moved.

When working in a tower hut with the transmitter on, it's just a matter of time before there is a little *zap*, someone goes *yeouch*, there are some unprintable philosophical, biological and/or religious observations, and there is a faint smell of burnt finger. What would have brought that on?

Well, someone was probably tightening a screw on the equipment panel, which is grounded, and just happened to touch the shaft of the screwdriver. Now, the screwdriver was grounded, the user's body was not and acted like an antenna, making a significant RF current flow between finger and screwdriver. Fingers have a high resistance so they burn — just a little black mark. But it hurts, and goes on hurting for a long time because the burn is deep.

Ah yes, the joys of playing with high-frequency energy. But, fried finger or not, we are not finished with the pattern. You know how much better a radio signal travels at night than during the daytime, so radio stations that have to accommodate a co-channel station operate with a daytime pattern and power, and a nighttime pattern and power. That means a different set of T-net-

works to produce the phasing among the towers for a different pattern. Often, one or more towers are switched off, and the transmitter power is reduced to half.

There is a device called a phase monitor. It continuously measures the antenna tower currents and phases, and provide signals that can be sent back to the studio to be displayed there.

Showing Off

Now it is necessary to demonstrate that the new radio station meets the requirements of the license. One of the license requirements is that measurements of field strength must be made throughout the radio station service area and plotted to show that the patterns conform with the limits specified.

This is done by "driving the radials," which means that one takes a field strength meter and drives straight out from the transmitter, taking field strength readings at specified places. For example, the 90° radial is due east, and one travels outward along it from the transmitter until the signal strength drops to 0.25 $\mu\text{V}/\text{meter}$.

Needless to say, one does not drive "straight out" from the transmitter; it would be too bumpy. So it is necessary to plot on a

map points on the radial that are also on a road, take and record measurements at these points, and then interpolate between points on the radial to find locations of field intensity for a specified contour. Typical contours are 500 $\mu\text{V}/\text{meter}$, 250 $\mu\text{V}/\text{meter}$, 100 $\mu\text{V}/\text{meter}$, and so on. A capacity for educated guessing is useful here. Cooke's Variable Constant also helps with the interpolation. The result is called the Proof of Performance.

Next Time

So, that's that. One radio transmitter complete, yes? Nope!

Now we have to get the program from the studio to the transmitter. And we have to arrange for remote control of the transmitter from the studio, and get information about the transmitter operation back to the studio. We'll talk about these things next time.

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2. *ibid*, page 350.
3. *ibid*, page 357.

WIRELESS TELEGRAPH SERVICE, *continued from page 66*

receivers for the long wave arc circuits. Each is equipped with motordriven, rotating condensers, part of a scheme for continuous wave reception; each can be monitored individually. But the operator on duty is most concerned with marine work. He works ships at sea, receiving here but operating the transmitter at a distance. Messages for Los Angeles are of course delivered through the city office. A special room, completely shielded with copper mesh, houses the shortwave receiver.

In addition to the coastwise service rendered and the circuit to New York (carrying 750 to 1,000 messages daily), Mackay Radio connects with the Government cable to Alaska and with the telegraph department of the Chicago, Milwaukee, and Puget Sound for all of its points in the Northwest. Marine

service is operated on the East Coast from stations at New York and Palm Beach, Florida. Through purchase and recondition of the famed old German station at Sayille, Long Island, Mackay Radio looms as a competitor for transatlantic business.

Mackay Radio is an applicant for sufficient additional shortwave frequencies to set up a more complete continental system, connecting the principal cities of the country. By its twenty years of successful operation in the west, through its connection with Postal Telegraph for use as a pickup feeder, and with the backing of I.T.&T. in financial and patent matters, Mackay Radio's leaders command attention. The Vice president and general manager is A.Y. Tuel at New York. Haraden Pratt is chief engineer. H. L. Rodman is general superintendent at San Francisco.

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SILENT KEYS

We record the passing of the following AWA member with deep regret.

KENNETH "VAN" JACKMAN, MD, WA2DPM, 69, (8-18-10) was a retired professor emeritus from the orthopaedic faculty at the University of Rochester School of Medicine and Dentistry. He continued to teach there as needed and practiced orthopaedic surgery with a specialty in pediatric orthopaedics. After completing his medical training at the University of Rochester in 1967 he served in several hospitals including the U.S. Naval Hospital on Guam from 1969 until 1971. Jackman lived in the Saranac Lake region of the Adirondack Mountains of New York State, where he was a volunteer naturalist at the new Natural History Museum of the Adirondacks (The

Wild Center) and used his medical skills as a member of the Search and Rescue Association of the Northern Adirondacks (SARANAK). He was an avid Highland bagpiper, both as a soloist and as a member of the *Rochester Scottish Pipeband, Feadan Or* and *Ceildh Connection*. For many years Jackman was a volunteer at The AWA Electronic Communication Museum and was involved with emergency services as a member of the Adirondack Amateur Radio Association (AARA). A former Eagle Scout, he volunteered with the Otetiana Council, Inc. (Rochester), Boy Scouts of America. (Thanks to Lynn Bisha, W2BSN and *Rochester Medicine*, Spring/Summer 2010)

Please submit all information about members who have become Silent Keys to Charles S. Griffen, W1GYR, 1225 New Britain Avenue, West Hartford, CT 06110-2405. Silent Key notifications must confirm the person's death by one of the following means: a letter from a family member, a copy of a newspaper obituary notice, a copy of a death certificate, a letter from the family lawyer or the executor or mail returned by the U.S. Postal Service marked "Deceased."

MEASURING THE SELECTIVITY OF SOME 1920S RECEIVERS

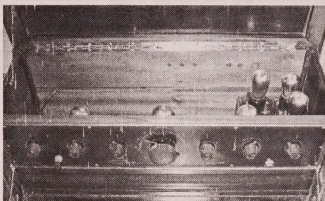
When I obtained a Thermiodyne TF-6 TRF set a couple of years ago, I was impressed with its ability to separate stations better than other 1920s battery TRFs, particularly at the high-frequency end of the dial, where many seem to peter out completely. The higher frequencies in the AM band as we now know it were not used much in the early 20s; many sets of the era didn't separate stations very well around or above 1000 kHz.

The Thermiodyne has four tuned circuits, with all four variable capacitors tuned simultaneously by a rack and gear assembly. Each of the four tuned circuits can be tweaked from the front panel with a separate fine tuning coaxial capacitor. I was not the first in my neighborhood to observe the tuning characteristic of this set. A good friend had one before me and noted the effect. Later, we each acquired a second example.

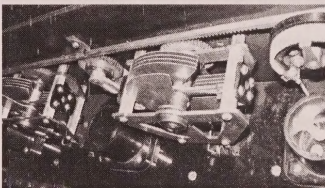
My first set was in a bad state because someone had removed the coupling capacitors that connect the coils of each tuned stage. I had to replace those to get the set working. They are the phenolic/foil/mica sandwich type as manufactured by the N.Y. Coil Co. The metal plate/mica sandwich Faradon type make good substitutes. These coupling caps are 0.002 uuf, and the caps in series with the main tuning capacitors are 0.009 uuf.

I attribute at least part of the receiver's performance to the degree of coupling obtained via these capacitors, and part to the four stages of tuning (in contrast to most trf 3-dialers, which had only three). When I obtained a second set with original components, I sold the first set to another collector at a swapmeet. My two sets and the two my friend had seemed to operate about the same.

This radio may not be too popular with collectors, since the only article I've seen



High-angle shot shows front panel and partial interior of the Thermiodyne TF-6.



Detail of variable capacitor linkage shows the rack-and-gear tuning.

on it was by Douglas in *Radio Age* for November 1977. (Note: this article was submitted before Richard Parks' article on the TF-6 appeared in the previous Journal—ed.) He praised its mechanical construction but said "it distorts and it doesn't tune sharply." To be fair, Douglas qualified his opinion on the basis of the one radio he had to examine, and I did find that the audio was distorted at medium to high levels.

The mechanical linkage of the four tuning capacitors is critical. If one of the tuning capacitor gears happens to jump a single notch on the rack, the vernier capacitor for that stage probably wouldn't have enough range to sharpen the tuning. Even with the linkage properly adjusted, one also has to be careful when tuning with the main dial. It must be

tuned close enough to the signal so that each of the four fine tuning capacitors can be effective in peaking the signal.

I finally obtained a sweep generator so I could quantify the shape of the passband for several of my old battery sets to see just how the Thermodyne really compared. I picked, for initial comparison, an AK Model 10 breadboard and a Grebe MU-1, which are both popular radios with collectors. The MU-1 seems to have a good reputation, at least among the collectors that I've known, and I was impressed by mine when I obtained it quite a few years back. I enjoy listening to AK type 10 breadboards, though I've never been particularly impressed with their selectivity. I plan to measure other sets but thought readers might be interested in the initial results on these models.

I used a Wavetek 185 sweep generator in conjunction with a TEK 465 scope to display response at the grid leak of the detector as the frequency was swept from about 40 kHz below to 40 kHz above the nominal tuning point of the receiver. The x axis of the scope is driven by the generator ramp voltage, and so can be translated directly to frequency. I fed the generator signal through the antenna connection and adjusted the level such that the peak of the signal was 1.6 volts at the grid leak, which I deemed was in the same ballpark as a strong signal producing listenable audio.

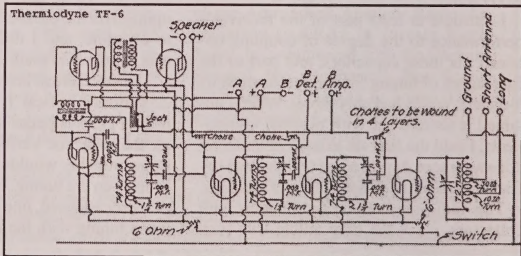
The level is important because the bandwidth does increase somewhat at higher voltages, and I wanted my measurements to be somewhat representative of conditions during listening to an actual received signal. The tuning stage nearest the antenna was effective in peaking the signal in all three sets so I decided that the impedance of the generator was not different enough from a long wire antenna to affect the results.

I decided to report my results in terms of two bandwidths (BW), one 6 db down from the peak at 1.6 volts and one 20 db down. A typical signal profile is shown in Figure 1, which is a photo of the scope display with the BW_{6db} and BW_{20db} shown by the arrows. I also noted that the grid leak resistor affected the selectivity (bandwidth decreased if grid leak was removed) so I would guess that using a larger grid leak could improve selectivity, but not dramatically. I'll explore this at another time.

For the three radios, the bandwidths at 600, 800, 900 and 1100 kHz are summarized in Table 1. I used the same set of tubes in the rf stages of all the sets tested. You can see that the Thermodyne has much narrower bandwidth than the AK 10 over the entire range of tuning and is lower than the Grebe at 900 kHz and above.

The AK 10 (Model 4600) in the report performed much better than two other Model 10s that I tested: one a restored 10C Model 4700 and the other a non-factory 10A (upright coils) without the first tube bias pot. I judged that the Model 4600 is typical of a good-performing original set. The Grebe MU-1 was a small console model with built in speaker.

My earlier observation that the Thermodyne was better at separating stations was confirmed by these measurements. My friend claimed he was able to separate stations every 10 kHz with his Thermodyne. (He simultaneously listened to the same signals on a modern set with digital read-out.) I think this might be the case for two



Schematic diagram of the TF-6.

distant stations but not for a strong local station competing with a weaker one. A strong local signal will blank out weak stations that are 10 or 20 kHz away even with the Thermiodyne.

The 20db bandwidth is quite broad for the AK breadboard. The Grebe MU-1 has slightly better selectivity than the Thermio-

dyne at the low end of the band but not as good at 900 kHz and above. One has to respect the capability of the Grebe since it has only three stages of tuning compared to four in the Thermiodyne. The sound coming out of the Grebe is better also, probably because it uses a C- voltage on the audio tube grids.

The Thermiodyne tuned a little more easily across the band than the Grebe because its tracking was more positive than the friction- coupled chain drive of the Grebe. Both of these sets were easier to tune than the AK breadboard. Of course, once favorite stations are logged, any of the sets could be easily tuned back to those settings. The TF-6 tunes as high as about 1150 kHz; the MU-1 to about 1220 kHz; the AK 4600 to about 1070 kHz.

There are other notable early sets with 4 stages of tuning, similar to the Thermiodyne. Examples are the AK 32, AK 33, and Sargent Rayment sets. Perhaps these too would exhibit selectivity comparable to the Thermiodyne. However, the single dial AK 32 and 33 sets lack the trimmer caps that seem necessary on the Thermiodyne. They rely on a simple ganged tuning scheme. The Sargent Rayment has the capacitor tweakers.

The Thermiodyne TF-7 has the same rf stage arrangement as the TF-6, but has an extra stage of audio. This was probably added to compensate for audio loss in the resistance/capacitance coupling used in place of the audio transformers in these sets. It would have the same selectivity as the TF-6.

	Thermiodyne				AK10 4600		GrebeMU-1	
Frequency (kHz)	BW 6 db	BW 20db	BW 6db	BW 20db	BW 6db	BW 20db	BW 6db	BW 20db
600	3.9	10	6.6	17	3.1	9.4		
800	6.5	15	8.8	46	4.0	13		
900	6.9	19	12	56	8.6	22		
1100	10	25	20*	71*	14	35		
* at 1070 khz, upper limit of AK 10 tuning								

Table 1. Bandwidth of receivers.

I plan to measure the selectivity of other TRF sets as a long term project. These include the Kellogg 504 Wavemaster, Stromberg Carlson 1B, Kilbourne and Clark Air Roamer, Northwestern 5D, Hammarlund HiQ, Kennedy XXX, Metrodyne Super 6, and several early superhet kit radios with Remler components (Hallock & Watson, Scott, WR Super 9, other hombrews) and a Western Electric 4D.

I haven't yet experimented with quantifying the selectivity of regenerative sets. Perhaps some readers have a notion of how this could be done. My initial idea is to use two am modulated signals of equal strength and determine how close they can be before they interfere with one another.

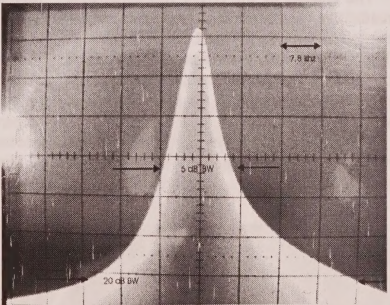


Figure 1. Photograph of AK 10 frequency trace centered on 800 khz showing bandwidth at 6 dB down (middle pair of arrows) and 20 dB down (lower pair of arrows). The horizontal scale of 7.8 khz/major division is illustrated by double arrow at upper right. Vertical scale is 0.2 volts/major division.

THE COMMUNICATIONS RECEIVER



BY **BARRY WILLIAMS, KDSVC**, 2002 MUSTANG LANE, ROSHARON, TX 77583
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The National SW-4 Thrill Box

The 4-tube SW-4 "Thrill Box" was the second production receiver built by The National Company. It is the most rare of the early National sets. Radio writer, editor and historian Bill Orr called it "a collector's dream." It was produced for just a little over a year, spanning 1929, with a few built in 1928 and 1930. The SW-5, which followed, was a much better receiver. Once it was announced, the SW-4 was definitely obsolete.

It is possible that the design of the SW-4 may have been influenced by that of the RCA 1145. Some accounts indicate that the 1145 design was given to James Millen by friends at RCA. RCA may have also given the design to several others in order to increase the sales of their tubes.

The chassis of the SW-4 has a tag that reads "This Receiver Designed for Best Operation When Used With RCA Radiotrons." The battery hook up and tuning instructions on the inside of the lid states "This apparatus has been designed for best operation with RCA Radiotrons."

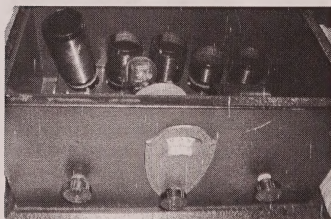
The RCA 1145 was an export shortwave receiver with an untuned RF stage using a screen grid tube. The disadvantage of this

design was the reduced selectivity and tendency to overload. The advantages were the elimination of tuning "holes" caused by antenna circuit resonance, the reduction of the effect of antenna movement effect on tuning, and the reduction of the signal generated by an oscillating detector reaching the antenna.

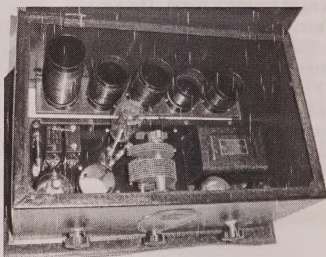
If the SW-4 was designed after the RCA 1145, it includes several improvements. Both receivers were four-tube designs with an untuned RF stage using the new screen grid type 22A. Both had regenerative detectors and two audio stages. The RCA design used an 01A detector with an 01A first audio. The final audio in the RCA receiver was a 12A, usually called a semi-power tube in period literature. This lineup allowed good performance from batteries. The RCA audio stages were coupled by transformers.

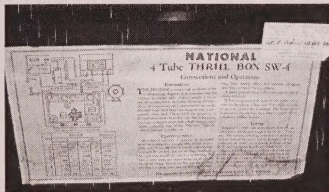
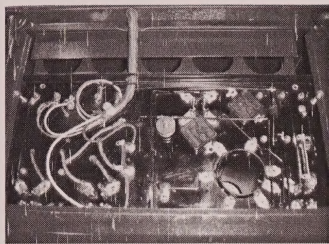
The SW-4 took advantage of a couple of newer tubes. It used the 22A, which was the only screen grid tube available, in the RF stage, an 00A as detector, the 40 high mu triode in the first audio and the 71 power audio.

The 00A is a gaseous detector tube. By operating the plate close to the breakdown



Two views of the SW-4.





Underchassis wiring and hookup instructions on lid.

point, the conversion gain was good, but the noise from the tube caused it to mask weak signals. Many users swapped their 00A detectors for 01A tubes. This needed a change in plate voltage and a larger amount of regeneration, but the results allowed the user to hear weaker signals.

National used impedance coupling in the audio system. At that time, transformers had narrower frequency response compared to resistance or impedance coupling. In the first *National Annual* the only receivers shown were Browning-Drake receivers. These were built in National's lab with all three types of coupling. The resistance coupling provided the best audio frequency response, but was also the least efficient method. Impedance coupling was more efficient and had very good frequency response.

The SW-4 was the first receiver to incorporate National "Impedaformer" coupling units. The set used a dual section coupler National called the "Duo Coupler." This type of coupler was also used in the SW-3, though that receiver used a single section unit (S-101). Each section contained a plate resistor, a coupling ca-

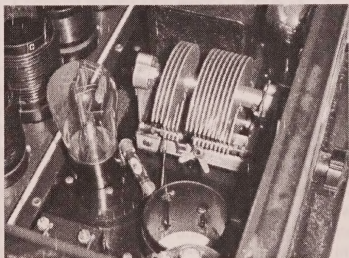
pacitor and a tapped inductance wired as an autotransformer.

Probably the most interesting circuit innovation was the type EC tuning capacitor. This capacitor was split into two sections. The rotor and its plates are common to the two sections. The rear 4 stator plates are permanently connected in the circuit. A very simple manual switch couples the front stator plates in parallel with the rear section. This allows the switch to be opened and the rear section used for tuning on the short wave bands.

The switch was closed for tuning the medium wave (AM broadcast) bands. The rotation of the tuning capacitor is 270 degrees, with a tuning dial reading 0 to 150 divisions. This system allowed reasonably slow tuning on the short wave bands with full coverage of the broadcast band at a faster tuning rate.

The cabinet for the SW-4 is similar to the one later used on the SW-5. Basically there is a bottom skirt on a rectangular box with hinged lid. The front panel has a type E lighted dial with a variable resistor to the left and a switch to the right. The 3,000 ohm variable resistor is used to vary the feedback and gain. The switch is to control the filament power.

The coils for the SW-4 are very similar to the ones used in the SW-2. A,B,C and D coils were standard, the E and F coils were available as additional items. The coils



The special Type EC tuning condenser. Simple butterfly switch on frame was used to connect the two stator sections for broadcast band reception.

voltage of 4.5 volts. The battery cable has six conductors, the Black lead goes to the A- terminal, the Green goes to the C- terminal, the Yellow line goes to A+, B-, and C+, the Blue goes to +45, the Brown to 135 volts and the Red to 180 volts.

The instructions call for an antenna about 75 to 100 feet long as high and clear as possible. The ground is connected to the negative terminal of the "A" battery, not the chassis of the receiver.

The audio output of the 71A is adequate to drive a large speaker. If a smaller speaker or headphones were to be used, National recommended the addition of a "National Tone Filter" for protection.

The parts kits available included the following:

- Foundation Unit
- Set of 4 Coils
- Type E Lighted Dial
- Type EC4 Special Tuning Condenser
- SW-4 Duo Coupler
- No. 10 HF Impedance
- Switch with National Knob
- 15 Ohm Fixed Resistor
- 1 Ohm Fixed Resistor
- .00025 Fixed Condenser
- .0001 Fixed Condenser
- .001 Fixed Condenser
- Two .5 Fixed Condensers
- 3000 Ohm Special Variable Resistor
with National Knob
- 6 Megohm Grid Leak

- Three Binding Posts
- Six Wire Power Cable

Extras included the following:

- Cabinet
- Type "E" Coil
- Type "F" Coil

As was normal, no tubes were included. The list price for a wired receiver, case and all coils was \$65.00. The net price from Chicago Radio Apparatus Co. Inc. for this receiver wired and tested was \$38.22.

It is interesting to compare the RCA 1145 and the SW-4. The idea of an untuned screen grid tube to couple a standard three tube receiver to the antenna is not unique. The differences in tubes used, the interesting capacitor with switch and the type of audio coupling argue against the direct use of the RCA design.

The fact that Millen was a mechanical engineer, and did not do a complete design of a receiver, indicates that he did have some help with the electrical design. Glenn Browning and Frederick Drake both worked with National. Browning's resume indicates that he worked as a consultant to National for several years ending in 1928, though he was given recognition by National in the M-B receivers (Millen and Browning.) Robert Kruse also was a consulting engineer with National at this time. In all I believe that the differences indicate that this was not a direct copy of the RCA receiver.

RADIO REPRODUCERS

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The O'Neil Model LS19 Loudspeaker

At the AWA World Convention this fall I was the lucky bidder on an O'Neil LS19 lighted ship speaker. After the auction was over I was asked numerous times why I had bid on this particular speaker. There were a couple of reasons. One of them was that it had belonged to our long time friend and fellow collector Larry Babcock.

When Larry purchased this speaker he called me soon afterwards to tell me he had found it in an antique shop and wanted to know something about it. After that, we talked about it almost every time we met. Larry would always come and visit at my table when we were at a show together, and the conversation usually led up to a mention of the O'Neil speaker.

He knew that I would like to own it but he said he wanted to keep and enjoy it for awhile. Each time I offered to buy it, he told me that it wasn't for sale but that I probably would own it someday. Well, I guess that his estate auction at the Convention was the day he spoke about.

The second reason that I wanted this



The O'Neil LS-19 illuminated speaker.

speaker was that it is a different version of the LS19 that I have in my collection. My version has the O'Neil logo cast into the waves on the speaker front as shown in the photo. Larry's speaker does not have the logo. I have the original ad for this speaker and it shows the logo—though it looks much larger than it really is.

When I first saw Larry's model, I thought it might have a different reproducer. However it turned out to be identical to the one in the LS19 that I already had. There are no other differences that I can find.

This reproducer is unique in the O'Neil line. I have documented seven different configurations and sizes of the O'Neil cone speaker but the lighted LS19 is the only version with this type. The photos include both types of reproducers. One shows the



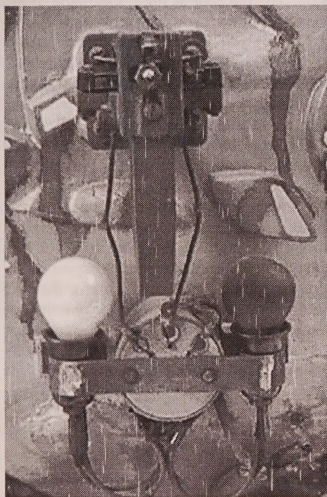
The O'Neil logo is cast into the wave design.

version on the LS19 with lights and the other, a flat version with double coils as used on the nonlighted LS-19.

The lighted LS19 reproducer, as you can see in the photo, has the O'Neil logo and patent information number stamped on the top of the aluminum body. Some versions of this reproducer have the logo on the back



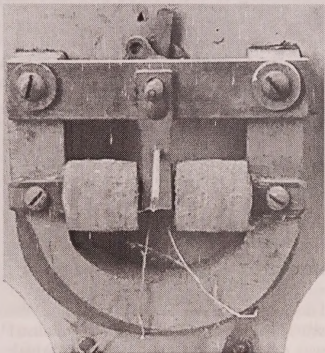
Logo and patent information as they appear on the reproducer.



Lamp assembly and reproducer. The can behind the lamps is a potted filter network.

mounting block rather than the top. The flat dual coil version does not carry the logo.

Notice the red and blue lamp assembly on the lighted model. These are 10-watt bulbs that once operated on the 110 volt line that was standard for the day. Although I can't see through the painted surface of the bulbs, I don't think they have carbon



The flat, 2-coil reproducer as used on the unlighted LS-19

filaments. The lamps are connected in parallel so each operates from the full voltage.

I have several lighted speakers in my collection, and some have a pair of bulbs wired in series to produce a low glow just for background effect. I think that the LS-19 is the most beautiful with its tall ship design and blue and red background lighting.

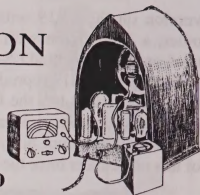
The original oval cone is brown with a random aqua marble design on the inside only. The 19 $\frac{1}{4}$ " high speaker frame is cast aluminum with an antique gold/bronze finish highlighted with an antique aqua/green patina around the frame and waves. The stand has a dolphin's head design on the feet that extends back and overlaps to form the dolphin's tail.

I consider the LS19 speaker to be in the rare category. Also watch for an O'Neil Junior model of the same design, but without lights. It's made of cast iron and has the dual coil reproducer unit.

EQUIPMENT RESTORATION

BY **DAN MERZ**, 1268 WHITE BLUFFS ST., RICHLAND, WA 99352
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Submit restoration tips in Word, WordPerfect or plain text files with any illustrations in separate jpeg, tif or bmp files (not embedded in document).



Making a Cabinet for a Federal 61 Radio

Did you ever look at a beaten down radio and think “I could fix that and end up with a nice set for my trouble?” I had decided to acquire a Federal 61 because I loved the looks of the radio, including the profusion of knobs and dials on the panel and the good looking parts inside. I ended up trading a couple of nice 30s sets for a 61 panel/chassis, thinking I might eventually come across a cabinet.

Generally if you wait long enough, you’ll find what you’re looking for but I didn’t want to wait a long time. After about a year I decided I’d have to make a cabinet for the set. This turned into a big project because I was determined to duplicate an original. Fortunately I had a friend with a radio that I could examine very closely for detail.

The project was pretty straightforward. The biggest tasks were making the hardware and the various molding and edges—the latter requiring some ingenuity to achieve with an ordinary router.

For the main box, I used the best quality half-inch plywood that I could get from local hardware stores. The “good side” of the plywood would become the interior surfaces of the cabinet. The other side would be covered with mahogany veneer to become the outer surfaces. I used a biscuit cutter to make all the joints, and I veneered the outside of the box after assembly. Pencil lines

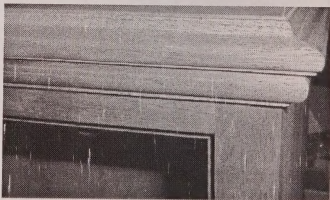
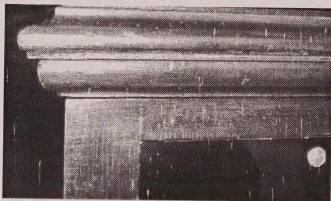
on the veneer at the the rear corners simulated the appearance of the original joints.

The front frame for the radio panel was made from solid Honduras mahogany. To make the lid, a central core of plywood was veneered over the top and underside after being banded with solid mahogany on all four edges. This provided a solid wood base in which to apply the edge molding.

Cutting the lid edge profile required making a sloped table for the router to get the correct angle for part of the contour (Figures 1a & 1b.) I made the lower frame of mahogany for the deep moldings on the base. The the central floor was made from the plywood.

I was missing all the panel mounting hardware, so I had to fabricate it. Stainless steel was used to emulate the nickel plated originals. The lid hinges were made from a long stainless steel hinge obtained from McMaster/Carr. It was cut into sections close to the same size as the originals. Fortunately, the concealed-ball catch that holds the lid closed was available from Lowe’s Hardware and is a somewhat standard item still. I had to make the matching catch on the lid itself from stainless steel.

I purchased metal grommets for the inside and outside of the power wire holes at the rear. The side lid stop and associated hardware were made from stainless steel.



Figs 1a and 1b. Detail of lid molding. Original Federal at left; reproduction at right.

Some of the hardware is shown in Figure 2, atop the bottom piece and front frame. I tried to make a reproduction of the label inside the lid by photographing and printing the original. But I ended up creating the label by typing the text using a drawing program and pasting in the photographed illustrations that are part of the design. Fortunately, a local print shop was able to copy and print the final layout on stiff paper. This procedure resulted in the best reproduced label that I've seen; it is nearly identical to an original. If you need one for your set, feel free to contact me. I'd be happy to provide it for the cost of copying and shipping.

The completed set with cabinet is shown in Figure 3. Some of the other jobs I had to do out while restoring the Federal set involved:

Replacement of missing switch contacts on the panel. These contacts are smaller than most. I cut them from some nickel based welding rod (used for welding cast iron.) I tapped the metal on the back side and used a small brass machine screw and nut to hold it on.

Repairing open RF transformers. As discussed by Douglas in *Radio Age* (Sept 1981), these transformers can be opened and repaired, but it's not for the faint of heart.

Rewinding the Type 66 audio transformer. This procedure will be the subject of a future article, since this transformer often is bad and is hard to find. I have rewound over 15 of them for myself and others. The result is a good match with the original.

What's to be learned from my effort

An original cabinet is to be treasured, even if in bad condition. A lot of Federal cabinets have suffered over time and I would not classify them as durable. But salvaging the worst of them is a lot easier than making a new one.

Stainless steel is a good material to make parts that look like the original nickel-plated versions. However, it is difficult to work and cut as compared to brass. Rather than an ordinary hacksaw blade, use one with carbide embedded particles, or a cut-off abrasive blade. Shaping is much easier with a grinding wheel than with files. Save your

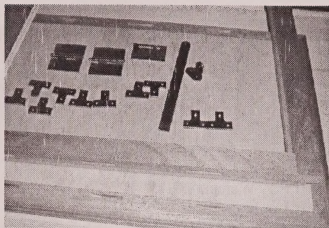


Fig. 2. Miscellaneous hardware atop cabinet bottom and surrounded by front frame.

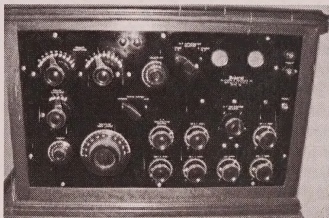


Fig. 3. The finished Federal 61 cabinet with radio installed.

files for final smoothing after grinding.

I am a strong advocate of NGR (non-grain-raising) stains and of lacquer for finishing. The Deft spray-can lacquers are quick and convenient for most radio-related finishing. When trying to duplicate some of the darker cabinet finishes, a mix of oil-based Jacobean and Red Mahogany wiping stains may be necessary; they result in darker effects not achievable with the NGR type. However, the use of NGR brown mahogany stain worked out well for the 61 cabinet.

The cabinet I made is as good or better than most originals I've seen and I enjoy it every time I look at it. I have a friend with a new-in-the-crate Federal 61. He took one look at mine and immediately told me he'd enjoy having it. Perhaps he was being kind

Note: In my October article on the Lumiere speaker, in the last paragraph on p. 57, "2 inch hole" should have been "½ inch hole" and the ⅝" dimension given for the width of "approximately ⅝."

PHOTOGRAPHING ANTIQUE RADIOS

PART 1: THE BASICS

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The objective of this article is to provide the collector, historian and seller of antique radios some basic information for improving the quality of photographs taken for documentation of collections, publications, presentations, and auctions. Much of the information contained here can be found in a variety of “how to” books on photography—the main difference being that the information here is specific to photographing antique radio equipment. It addresses certain problems unique to radio equipment: highly reflecting black panels, curved reflecting surfaces (e.g., vacuum tubes,) small components with fine detail, large consoles, instruction sheets shadowed by lid walls, etc.

The basic information is divided into five sections: 1) “Background Setups” comparing seamless-paper backdrops with light tents, 2) “Basic Equipment” describing cameras, tripods, and lighting, 3) “Picture Composition” summarizing steps for preparing subjects, selecting view angles and perspective, and adjusting lighting, and 4) “Camera Settings” for key features used most often such as focus, exposure modes, exposure compensation, and color balance. Part II titled “Techniques for Problem Shots” will address solutions to specific problems such as those identified in the first paragraph, and Part III entitled “Post-Processing Techniques” will review specific techniques and program software options for enhancing photographs.

Backgrounds

Two main types of backdrops used for shooting radio artifacts are seamless paper and studio light tents, examples of which are shown in Fig. 1. While both approaches pro-

duce excellent results, seamless paper backdrops can be used for photographing virtually any size of artifact, produce more dramatic shadows for a three-dimensional look, and cost less than light tents. Light tents work well for smaller artifacts, but produce less dramatic shadows and are generally less convenient to use.

Seamless background paper comes in 36-foot rolls with widths of 53" and 107", and in almost any color imaginable (see www.briteklighting.com/paperbackdrops.html). The most popular colors for photography are white, light gray and light blue, but I have found that white is too bright and can cause loss of subtle shadows when brightness and contrast are adjusted during post processing. I prefer paper rolls which can be found in many local camera stores, often for under \$30.

The rolls can be hung from the wall or ceiling over the workspace with a closet rod so paper can be pulled down over a bench or table with a gentle transition curve from vertical to horizontal as shown in Fig. 1. An angled iron bar or other weight can be used at the front of the bench to keep the paper flat. As the paper becomes soiled it can be cut off using the iron weight as a guide for a straight cut. After the shooting is complete, the paper can be conveniently returned to the roll for out-of-the-way storage.

The workspace can be situated on a work bench or a table adjacent to a garage door to let in sufficient light to shoot at certain times of the day without benefit of artificial lights. Such a setup is most useful for those who do not wish to invest in lighting equipment and do not mind limited shooting times determined by sun angle and cloud cover.

Consoles can be photographed by placing a cardboard box on top of the bench

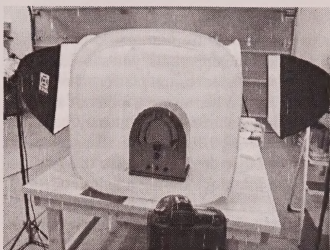
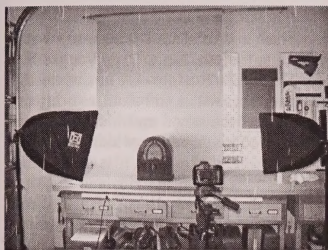


Fig. 1. Shooting with a seamless paper backdrop (left) and a light tent.

near the edge such that the top of the box exceeds the height of the console. The paper can be draped over the box, down the front of the bench, and onto the floor where the console will be placed.

Better lighting for consoles can be obtained by shooting them against an outside wall of the house using natural light at certain times of the day—the garage door being a most convenient location. In this case, place the roll on the driveway just in front of the door, pull up enough paper to exceed the height of the console, and tape the end of the paper to the garage door with blue masking tape at three or four points. Unroll enough paper on the driveway to accommodate the console, set the console on the paper, and you are ready to shoot. If you do choose this technique—which produces excellent results—be sure no one can open the garage door while you are shooting! Also, be sure *not* to shoot in direct sunlight.

Light tents are very easy to use and require little instruction. Unfold and erect the light tent, set it on a bench, attach the background to the top rear of the tent and allow it to drape down to the bottom front, set the radio artifact on the draped background, position the two artificial lighting fixtures on either side of the tent, and you are ready to shoot. All the information you need for using light-tent equipment can be found on manufacturer websites by Googling “light tents.” For example, visit the EZCube™ web site at <http://www.ezcube.com/>, which contains lots of useful information including short video clips explaining how to set

up and use light tents.

The EZCube tents come in five different sizes ranging from 12" to 55" on a side with a prices currently ranging between \$55 and \$150. The manufacturer recommends 2-3 inch spacing on each side, so a radio with a maximum dimension of, say, 35" would require a 40" light cube costing \$125. Instructions for building your own light cube at a much lower cost can be found on the Internet by Googling “Creative Pro light tent.”

Basic Equipment

Cameras. While I prefer a good SLR camera such as the Nikon D70s and a 28-105mm zoom lens with a macro setting, almost any good digital camera with a zoom feature and at least four megapixels will do. Key features you will use include: 1) a zoom lens, 2) a macro mode for close-ups, 3) a sufficiently large screen for image review, 4) user-controlled exposure modes including multi-program-auto [(P) for most shots, and aperture-priority-auto (A) to increase depth of field for close-ups], and 5) a readily accessible exposure compensation control.

The use and settings of these features will be addressed in the various sections that follow. Since you can generally download images much faster with a memory-card reader than using a direct connection to the camera output, you should also look for a camera from which you can extract the memory card without having to remove it from the tripod.

Tripods. Speaking of tripods, not all tripods are equal. Since you will want to

take many shots from an angle above the top of the radio apparatus, you should select a tripod with a maximum platform height of at least 58". When using tripods of a standard height (about 49"), you may have to perch the tripod legs on small cardboard boxes or other devices to raise the height. You also might try sliding a length of PVC pipe over the bottom of each leg to raise the height, although you may have to remove the rubber feet first.

Alternatively, you can use a small coffee table placed in front of the bench as a platform for the subject so you can shoot downwards. You will also want to use a tripod with a quick-release shoe so you can remove the camera from the tripod without having to unscrew it. You can purchase a universal quick-release adaptor plate to convert almost any existing tripod (see www.tripodquickrelease.com/Quick_Release_Adapters.htm).

Lighting. The two options for artificial lights are incandescent and fluorescent. I much prefer daylight (5000k) fluorescent lights designed specifically for photography because they burn much cooler and have a much longer life. An example of a two-stand lighting system with 16" x 16" soft reflector boxes made by Kühl Lite™ is the 120 and 30 Combo Kit shown in Fig. 2, which is currently offered at \$265. This set comes with four 30-watt bulbs in one reflector and one 30-watt bulb in the second reflector.

This light set is also excellent for use with paper backdrops, as well, but for paper backdrops I recommend that you use four 30-watt bulbs in both reflectors. When shooting with background paper, be sure to use the removable diffuser panels over the front of the reflector housing (included in the kit but not shown in the figure) that spread the light, thereby reducing hotspots from reflective surfaces such as radio panels.

Picture Composition

Preparing the Artifact. Preparing the radio artifact is one of the most important and yet most-often overlooked steps. First, I always dust the subject with a soft long-

hair brush and/or clean it with warm water using a soft cloth. Next, I apply a product like Howard's Restore-A-Finish® to the wood surfaces with a soft cloth, to bring out the color of the wood and hide nicks and scratches. This product, which comes in both light and dark colors, acts more like a colored polish than a stain, and will not harm or dissolve existing finishes of antique radio equipment. Finally, I set the knobs and controls to a position with a pleasing appearance that does not hide pertinent panel labeling.

View Angle. The next step is to pick a view angle, which for antique radios will generally fall into one of the four categories: *straight-on* in which none of the sides or top are visible, *top-center* in which the front and top are visible, and *top-right* or *top-left* in which the top and the right or left side respectively are visible.

For some shots you may want to use a small wood support to tilt the subject (e.g. a radio in a box) towards the camera and/or prop up a box lid. A very large number of view angles and types of shots of interest to the antique radio enthusiast can be seen in my book *Radiola*—a limited-view version of which can be viewed on Google Book Search free of charge by Googling *Radiola* at http://books.google.com/advanced_

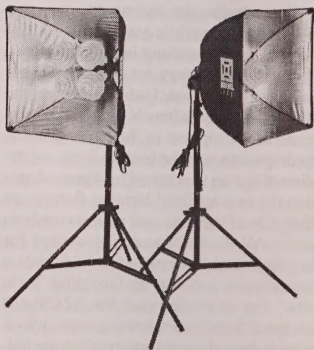


Fig. 2. Kühl Lite™ 2-stand lighting kit with two 16" x 16" soft reflector boxes.

book_search. This book is a good place to start when composing shots.

Perspective. The next step is selecting the distance of the camera to the subject. A general rule of thumb is that you want to maximize the image on the camera screen. You can do this by selecting the appropriate combination of camera distance and zoom setting of the lens. The closer the camera is the object, the more noticeable will be the convergence angle of the sides or top as the object recedes towards infinity. Conversely, as the camera is moved further from the object, the convergence angle will be less.

Lighting. The last step is adjusting the lighting. If you choose to use natural light, you are limited in the times of the day and the orientation of the object relative to the direction of the light. If you use artificial lights with paper backdrops indoors, you can adjust the distances and heights of the light sources relative to the subject. You can also introduce interesting shadows by positioning the lights asymmetrically with regard to either height or distance or by using a different number of bulbs in the light fixtures. Be sure to turn off all other lights in the room. To avoid glare, be sure the lights are positioned such that they do not form specular (equal) angles with the camera. With a little practice you can achieve very interesting results.

If you use a light cube or tent, you will be placing the lights on either side of the enclosure. The instructions say that shadows can be produced by asymmetric illumination using a different number of bulbs in the two light fixtures—for example, four bulbs in one fixture and one bulb in the other. However, I have had little luck producing the marked shadows readily achiev-

able with background paper. Compare (Fig. 3) the photo obtained using a paper background with that obtained by using a light tent. Worse yet, the light tent produces a noticeable reflection in flat black panels found on many early radios, a reflection which can be difficult to eliminate. This issue will be addressed in more detail in Part II.

For those preferring even sharper shadows, remove the light diffuser panels from the light reflectors and move the subject back towards the vertical portion of the background paper. For those preferring a stark white background, use white background paper, equal lighting on either side of the subject, and diffuser panels over the

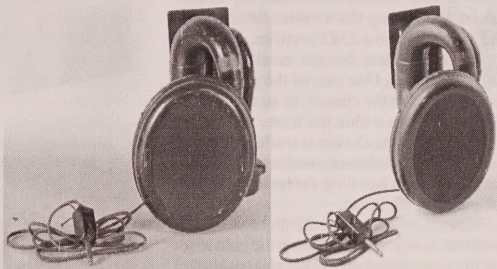


Fig. 3. Comparison of shadows produced using background paper (left) and a light tent.

light reflectors. A completely white background can also be easily achieved with post-processing software.

Camera Settings

While camera settings for specific applications will be addressed in Part II, certain generalities can be made for shooting antique radio apparatus. I have found the following settings to be both simple and effective.

Use the “single-area” autofocus mode. If you have trouble focusing on flat panels lacking detail required for autofocus operation, simply point the camera to a different subject area having more detail, depress the

(continued on page 63)

RADIO REHAB 101

EDITED BY **DICK PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
E-MAIL: dparks999@verizon.net. PLEASE INCLUDE SASE FOR REPLY.

The Grebe Synchronette Mantle Radio

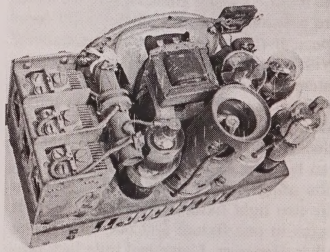
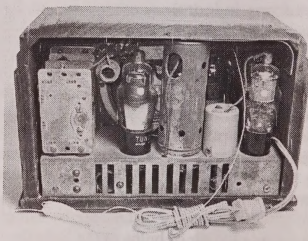
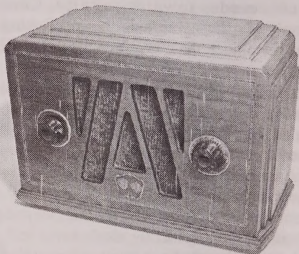
In 1933 a line of high-voltage heater tubes arrived in the market, including the 43, a version of the 42 power pentode with a 25 volt heater. the new tube opened up the field for transformerless designs and smaller chasses. Here's one result—a TRF mantle radio made by Grebe about 1933 using the 43 with three 6 volt RF pentodes and a 25Z5 rectifier.

Transformerless designs usually involve a “hot” chassis. One side of the power line is connected to the chassis, or sometimes to a “ground” bus within the frame. Often the connection to the chassis is made by throwing the on/off switch on, making for a risky situation when handling the receiver on the bench or in the home.

When I work on one of these sets, my practice is to rewire it to keep the cold side of the line always grounded and make the power switch control the hot power lead. Of course, this means fitting a polarized power plug as well. Note: sometimes this alteration can produce extra hum in the audio because of the proximity of the now-hot AC switch near the volume control element.

The little set has a three-gang tuning cap and needs an external antenna. There's no AVC, so tuning across the band can be unsettling when a strong local comes blasting through. The speaker has a field winding AND there's a filter choke to boot.

In this set there was one more complication: asbestos, found as a thin insulating pad under the cabinet top above the two hottest tubes and also wrapped around a filament dropping resistor mounted on the back chassis lip. This stuff is now known to cause cancer, specifically a form called mesothelioma, and it will eventually kill you if enough asbestos dust or fibers get



Three views of the Grebe Synchronette.

into your lungs.

As found, the set played with lots of hum and distortion. There had been repairs by the proverbial shoemaker, so I needed to redo some of the fixes as well as install a complete set of replacement paper capacitors. Alignment consisted of touching up five trimmer caps on a weak station around 1400 Kc.

The ripped speaker was beyond patching, so I decided to try my hand at reconing, with success. Then I replaced the 177-ohm 25-watt dropping resistor with two series 1N4007 silicon diodes, wired to make the heater string positive with respect to ground. This change gives the heater string roughly the same power. DC measurements can be misleading because of the half-sine waveform, but the set works all the same.

Now the asbestos is gone and the set runs a lot cooler, because I put a 4"x4" inch piece of copperclad up above the hot tubes where the insulating pad was.

Apparently this is the only set of its kind that Grebe made. It has a cute cabinet with a pretty and understated inlay on its front face. I refinished the outside using a couple of coats of tung oil after removing the aged and flaking varnish.

The Grebe nameplate shined up nicely and I preserved its glow with a coat of clear lacquer. Unfortunately, the matching circular escutcheon under the volume control knob was missing. I made a piece from more thin copperclad, painted as best I could to match the color of the other trim pieces.

This radio is destined for eBay recycling—keep an eye out!

PHOTOGRAPHING ANTIQUE RADIOS, *continued from page 61*

release button half way to hold the focus setting, return to the original aim point, and then fully depress the release button.

Set the exposure compensation mode to $+1/2$ or $+1$ for all shots to compensate for the fact that the background will always be lighter than the subject when using either a light tent or paper background. I prefer to take pictures with both $+1/2$ and $+1$ settings. (Be sure to return the compensation setting to 0 at the end of the shoot.)

Use the auto white balance setting for all lighting techniques described here.

Use the program setting (generally marked P) rather than the "auto" setting for most shots. If part of the subject is out of focus (which occurs most often in the macro mode for close-ups), switch to the auto-aperture control mode (generally marked A), and increase the f-stop to f-8 to f-11, thereby increasing the depth of field.

Always use the macro mode and auto-aperture control program setting for close-

ups with the aperture set at f-11 or higher, if necessary. If you want to focus on one feature and blur the background, set the aperture to a low f-stop such as f-3.5.

With the simple information given here, you can vastly improve the photographs of your antique radio apparatus. Be sure you become familiar with the settings on your camera so you do not have to fumble with them while shooting. There is nothing more frustrating than being distracted in the middle of a shoot by having to study the instruction manual.

At some point, you should experiment with other settings and modes to achieve different, and possibly more dramatic, results. For example, to fill in unwanted shadows you might try supplementing your fixed lighting (natural or artificial) with a flash or combine outdoor lighting with artificial lights. In the next installment, I will address the most common problems encountered in shooting radio equipment.

WIRELESS TELEGRAPH SERVICE IN THE WEST

This "Golden Oldie" was reprinted from the May, 1930 issue of Radio Industries magazine at the suggestion of Journal vacuum tube columnist Lud Sibley. It is a unique snapshot of the Development of Mackay Radio and of a time when vacuum tubes were beginning to supplant carbon arcs in commercial communications service—mfe

“E arly in 1897 there was a great flutter in the dove-cotes of telegraphy, and the holders of the many millions of telegraph securities, and those interested in allied industries, began to be alarmed for the safety of their property.” *From Preface to J.J. Fahie's Wireless Telegraphy, 18381899 (Blackwood, London, 1900.)*

Marconi's convincing demonstrations before the close of the last century and his organization of a syndicate to exploit space telegraphy led the expectant public to believe the wildest prophecies. Thousands of miles of disfiguring telegraph polelines would be dismantled. Centuries hence explorers would dredge up lengths of abandoned submarine cable and would wonderingly display them with other monsters of the deep. But imagination was running riot. A step at a time must be taken. Practical directors of the Marconi Companies choose not to come immediately to grips with telegraph tycoons. For their dividends they looked to the shipto-shore business. Marine service is noncompetitive, supplementary to existing telegraph systems. Years of disappointment were to pass before the historic bridging of the Atlantic became a practical reality—an uninterrupted public service.

In the following twenty years Marconi had many followers; some passed him. Marine service became universal as a measure of safety. Military application was wide. Research was extensive; Bell telephone engineers took a hand. Amateur wireless be-

came a hobby. Then suddenly radio veered from its communication course. Broadcasting took the world by storm. Once more the public's imagination was captured. "Radio" and "broadcast" became all but synonymous terms, so much so that several present-day enterprises, scrambling for shortwave rights and reviving the communications idea, have reverted to the use of "wireless" to distinguish themselves.

But radio as a competitor to the telegraph was not wholly lost in the deluge of broadcasting or entirely dropped for the possibilities in the marine field. Wireless connection of inland cities colored the plans of promoters of such longforgotten companies as Clark's Continental Wireless Telegraph and Telephone and the Pacific W/T&T. Pioneers recall their stations, stock sales, but are hazy about message totals. However from this age sprang one organization which for the last twenty years has demonstrated its integrity and the practicability of pointtopoint communication. It is the Mackay Radio and Telegraph Company, the immediate successor to the operating department of the Federal Telegraph Company founded in 1911.

Federal, a California corporation, was the manufacturing and operating subsidiary of the Poulsen Wireless Corporation, and by its full name it quietly announced it was in the telegraph business to hold its own with the Morse wire systems. It held the American rights to the arc method of continuous wave communication, an invention of Dr. Valdemar Poulsen, famed Danish scientist. The United States Navy long favored this system and during the war period used it almost to the exclusion of the spark and alternator methods exploited by the giant Marconi syndicate.

Federal's early plans were ambitious. They took root on the progressive Pacific Coast; stations were established in the principal cities. An eastern extension was

projected. Circuits were extended from Los Angeles over to Phoenix, Arizona, and El Paso, Texas. It was only another step to build stations in Fort Worth, Kansas City, and Chicago. But western capital overreached itself; a retreat had to be made. Years later Rudolph Spreckels, of the famous family of that name, became the company's financial head. Meanwhile, intrenching itself thoroughly in coastal cities from San Diego to Seattle, Federal built up a large paid-traffic business which by 1917, when the Government as a war measure took over its stations, amounted to customer obligation enough to warrant leasing land wires to carry on during the war.

Radio operations were resumed after the war. New stations were built at Los Angeles, San Francisco, and Portland. The company's engineering staff has always contained distinguished men. In the early days there was Peter L. Jensen, a Dane and disciple of Poulsen, who himself was later to become a joint patentee of the dynamic speaker. The first chief engineer was Cyrill F. Elwell, English engineer who afterwards built famous arc stations at Rome and at Lyons, France. Dr. Lee de Forest, inventor of the vacuum tube, was with Federal in 1912. At the time he patented the oscillating Audion under which the company got a shop license which later helped to clarify its patent status.

Although the arc proved an excellent transmitter, the receiver was the handicap in the system. In the beginning the tikker method invented by Pedersen, Poulsen's coadjutor, served. But other ingenious schemes for continuous wave reception had to be invented. Patent control prevented the use of the more obvious heterodyne principle. Celebrated members of the present technical staff include Dr. Leonard F. Fuller and Frederick A. Kolster, inventor of the Government service decremeter, but whose name is better known in connection with the Kolster Radio Corporation which Federal and Brandes organized to manufacture broadcast receivers.

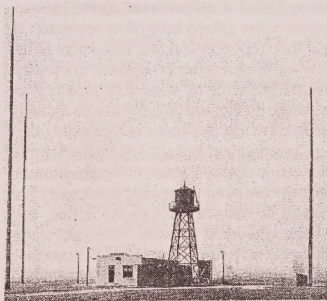
In 1927 the Mackay System, already owners of the Postal Telegraph and Commercial Cable Companies, purchased the Federal



Los Angeles receiving station showing frame aerials (loops) and short-wave antenna.

stations, reorganizing the system as Mackay Radio and Telegraph Company. This company along with Postal and Commercial subsequently became a unit in Col. Sosthenes Behn's huge International Telephone and Telegraph Corporation. At the time the system was handling more than 50 per cent of the total telegraph business between the points served. The Federal organization continues a relation as a manufacturing contractor, furnishing Mackay Radio with all its equipment. Its factory and laboratories are at Palo Alto, Calif., close to the campus of Leland Stanford, Jr., University many of whose graduates go into the radio industry.

Although Mackay Radio is shortly to extend its foreign service, a description of one city unit, comprising a central office with branches, a transmitting station, and a



Los Angeles transmitter building. Downleads from big aerials, and short-wave antennas on poles.

receiving station, is typical. The system as a whole is not 100 per cent radio, for although Los Angeles, San Francisco, Portland, and New York are radio units, other cities on the chain, like San Diego, Oakland, Tacoma, and Seattle, are connected by Morse wires. Transoceanic radio circuits reach Honolulu (the first to that point, in 1912, and getting 30 to 40 per cent of the business) and Lima, Peru, and a station is under construction in the Philippines.

Located in the heart of the Los Angeles financial district and presided over by Fred L. Dewey, District Manager, Mackay Radio's city office is a beehive of activity. With competition keen Mr. Dewey is proud of his office's daily average of over three thousand messages handled. Ever enthusiastic, he is out for more business. Speed, accuracy describe the service. While regular telegraph rates prevail, the slogan "15 words are sent for the usual price of 10" constitutes an attractive practice and a powerful sales argument. Mr. Dewey's certificate of membership in the Old Time Telegraphers' Historical Association testifies to his thirtyfive years in the game—ten with Mackay Radio.

Office practice compares favorably with other telegraph systems. Messages are 'phoned in by customers or are picked up by boy. Nearly thirty-five special customers—banks, fruit growers associations, and oil companies—are connected direct by telephone wires. Others have teletype printers to get their traffic in and out. Elsewhere in the city are branch offices connected in by wire. By telephone or by boys with motorcycles message pickup and delivery can be speedily effected to and from even outlying districts.

Considerable thought has been given to the office layout. There is a very minimum of time required in getting messages on a circuit or relayed through the office. San Diego is worked by wire. Messages originating there and destined for San Francisco or other points north are immediately transferred to a radio circuit at Los Angeles. The arc and shortwave channels to San Francisco are worked automatically or manually. Automatic sending is done with a punched tape prepared from a typewriter

keyboard. Received impulses are read from a tape fed from an ink recorder and passed before the eyes of an operator sitting at a typewriter. On the slower manual circuits the radio signal itself, brought into the office from the distant receiver on a telephone tone channel, is read by ear.

The Los Angeles transmitters, keyed directly from the central office, is located some fifteen miles out of the city. Rising from the low, flat coastal plain, its three high lattice towers can be seen for miles, dwarfing nearby oil derricks. A great spiderweb-like antenna spreads between them. Closer inspection reveals the downleads to the station building and the shorter high-frequency aerials. The crowded station indicates the progress of the art. Three great arcs burn silently and faithfully carrying the greater burden of the traffic. But here is the very front of the struggle for supremacy between arcs and vacuum tubes. Crowded into a building, originally built as the arcs' own home, seems to be all manner of tube equipment. New vacuum tube units are ready to take up the task of the arcs. Already they do supplementary service and respond quite as freely to the clickity-clack of the relays ever vibrating to the tune of the Morse code.

The point-to-point transmitters are licensed as KNR. Here also is KOK, a marine transmitter whose power supply as well as keying is remotely controlled. The arcs carrying the San Francisco load operate on the high waves, far above the broadcast band. Some point-to-point traffic goes up on short waves from tube sets. The marine transmitters work on intermediate frequencies. Lately, an additional short wave has been assigned to them for communication with certain foreign vessels now equipped for operation on the high frequencies.

Unique is the location of the Los Angeles receiver. It is in a cabin high up on the border of Elysian Park, a hilly public preserve within a couple of miles of the heart of the city. Below the streets and distant ocean spread out in one grand scene. Big frame aerials-loops-stand outside. The main operating room contains three multipanel

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CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. The AWA Journal classified ads are also available for browsing in the "AWA Journal On Line Edition" on our Internet Web site (www.antiquewireless.org). Please observe the following: (1) include as SASE if acknowledgement is desired; (2) material must be more than 25 years old and related to electronic communications; (3) give your full name, address and zip code; (4) repeats require another notice (we are not organized to repeat automatically); (5) the AWA is not responsible for any transaction; (6) we retain the right to reduce an ad's size if over seven lines; and (7) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: RICHARD RANSLEY, 25 Smith St., Sodus, NY 14551-1007 or email to richardransley@mac.com.

SELL/TRADE—LITERATURE

Original manuals for EICO, Heathkit, Sencore, Hickok, Sprague, Precision, B&K, Simpson, RCA, Triplett, B&W, Allied, Knight-Kit, Lafayette, Radio Shack, Micronta, Realistic, Archer, NRI, Conar, Dynakit, Accurate, Supreme, Meissner, Jackson, Paco, Dumont, Hallicrafters, Hammarlund, National, RME, Millen, Waters, Gonset, Collins, Drake, Echo-phone, Sonar, Superior, Lampkin, GE, Sylvania, Measurements, Boonton, General Radio, HP, Western Radio, Midland, Zenith, others. Also catalogs, radio magazines, handbooks, tube and transistor manuals, Riders, Sams. A.J. Bernard, P.O. Box 690098, Orlando, FL 32869 Tel: (407) 351-5536

Sams/Riders complete sets, \$100 each. Carter Elliott, 1460 Pinedale Road, Charlottesville, VA 22901 Tel. (434) 566-8767 E-mail: celliott14@aol.com

SELL/TRADE—BROADCAST RECEIVERS

Radiola IV, missing horn speaker, \$125; AK Model 33 missing battery cable and one audio transformer, \$30; AK Model 48, cabinet needs refinishing \$30. Contact Gaylord Ewing, P.O. Box 144, Morris, NY 13808

Zenith Transoceanic parts set, \$3 each; Zenith 7S635, \$50. Carter Elliott, 1460 Pinedale Road, Charlottesville, VA 22901 Tel. (434) 566-8767 E-mail: celliott14@aol.com

SELL/TRADE—COMMUNICATIONS GEAR

E.H. Scott receivers RBO-2, RCH both with original cabinets, \$150 each; Hallicrafters S-38E, \$ 60; Collins 51J4 parts set, \$150;

Murch MT-2000A antenna tuner with meter, \$130.; RME-152A VHF/UHF converter with manual, \$ 20. Carter Elliott, 1460 Pinedale Road, Charlottesville, VA 22901 Tel. (434) 566-8767 E-mail: celliott14@aol.com

SELL/TRADE—AUDIO

Pioneer SX-1500TD stereo receiver parts set, \$40; Teac Model A 1600 tape deck/recorder/speakers, \$70; Sonic 650 portable tube record player, \$15; Gorilla GG-25 Amplifier, \$30. Carter Elliott, 1460 Pinedale Road, Charlottesville, VA 22901 Tel. (434) 566-8767 E-mail: celliott14@aol.com

SELL/TRADE—TEST EQUIPMENT

Heath VTVM IM-10, \$15; Triplett 3432A Signal Generator, \$15. Carter Elliott, 1460 Pinedale Road, Charlottesville, VA 22901 Tel. (434) 566-8767 E-mail: celliott14@aol.com

SELL/TRADE—VACUUM TUBES

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TRANSMITTERS

EDITED BY **BRUCE J. HOWES, W1UJR**, 312 MURPHYS CORNER RD., WOOLWICH, ME 04579
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A 1934 Style Transmitter

By John Bauman, KB7NRN

In the early 1970s, Bill Orr, W6SAI, wrote a series of articles for *CQ* magazine on *The Golden Years of Radio*. One such article was "Build a 1934 Style Transmitter." It appeared in the Oct. 1971 issue.

I started building antique style radios ten years ago. After I had completed a couple of 1929 era receiver projects, a friend of mine, Frank Fisher, WA6RBQ, suggested that I build a transmitter. He copied Orr's 1934 TX article and gave it to me.

The rig uses a MOPA (Master Oscillator-Power Amplifier) circuit. A type 47 pentode in a crystal controlled oscillator circuit drives two type 46 tetrodes, wired as triodes, as the amplifier. A very simple, straightforward, tried and true design.

Construction

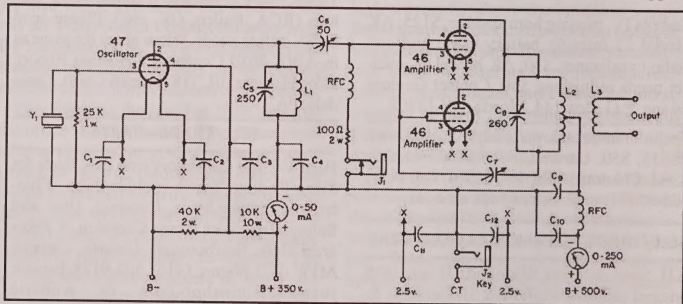
After building more antique style receivers and a couple of simple transmitters, I decided that I could, do justice to Bill's article. I had been gathering parts for it over the years, but once I got started it didn't take long to build—about two weeks working in my spare time.

After the layout was finished it was just a matter of drilling the holes and trial fitting the parts while making any corrections. Then the breadboard was stripped, sanded and parts reassembled. The wiring went well, RF is wired above the deck, with supply, metering and keying underneath. This kept the breadboard from getting cluttered.

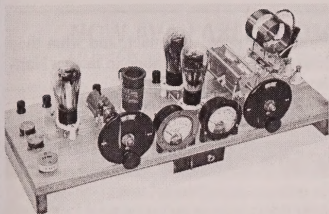
Initially my layout had the 47 oscillator tube on the far left followed by the oscillator coil and variable cap to the right. This left an empty space on the board between the oscillator and amplifier sections. Moving the coil to right of the variable cap, then moving the tube socket in the space vacated by the coil, balanced the layout making it more appealing to the eye.

But what to do with the holes left after moving the tube socket? How about installing two dummy crystal sockets to cover the holes? These would provide convenient places to store extra crystals and maintain the balance and symmetry of the layout.

I did away with the filament resistors that simulate a center tapped transformer since I have a power supply with a center tapped



Schematic of the MOPA rig. A 47 pentode (internally connected grid not shown) oscillator drives a pair of 46 tetrodes.



The completed rig is laid out neatly on its breadboard "chassis."

filament transformer. This eliminated even more parts, contributing to the uncluttered look.

All components are vintage except for the brass hardware and wood. Even the wire is from a spool over 50 years old. It's a hard question to answer when asked (as I am frequently) where the parts came from. I just don't remember where since I had been accumulating them for the last ten years.

I didn't much care for the large plug-in form for the PA tank coil that Bill used in his article. So I opted for a Bud BVL coil set with swing link coupling. It's a period item that adds to the "cool" factor!

The original design allows the oscillator to run all the time. In tests it proved difficult to copy anything with the oscillator screaming through the phones. So I added a switch to open the filament center tap while receiving.

That was better, but when transmitting it was still difficult to hear the difference between key down and key up. So I replaced the switch with a phone jack and tried keying at that location. Much better. A little chirp—yes, but tune the oscillator just right and it pretty much goes away. The schematic shown is of my transmitter "as built."

The "Smoke Test"

After double checking the wiring, I began to power up the rig. Following the article I tuned the oscillator, adjusted the coupling cap for the proper grid drive to the 46s, then neutralized the amp.

The article called for connecting a "12 volt flashlight bulb" across the output

link to serve as an RF indicator when carrying out this adjustment. I didn't have one, so I resorted to an LED with a 1k ohm resistor in series (for shame!) But it accomplished the task, and I was ready for a full power test.

Using a power supply from another project, I was able to supply 360 Vdc to the plates of both the oscillator and amplifier. Oscillator plate current when keyed was about 25 mA. Amplifier plate current was about 100 mA for approximately 20 watts out as read on my cheapie watt meter.

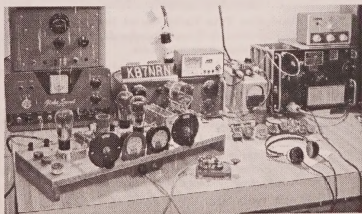
Half expecting something to go wrong because of a wiring error, I was happily surprised when everything worked as advertised!

On the Air

I plugged in a crystal for 7112 kHz, along with 40 meter oscillator and tank coils. I tuned up and then called CQ. There was an immediate response: "KB7NRN DE KØKP K." "You've got to be kidding me," I thought! But it was for real and I felt like a novice all over again, almost shaking as I replied.

Well Rex, KØKP, and I exchanged the usual info, giving each other 579 signal reports. I told him "RIG HR HB MOPA... UR MY 1st QSO." He came back "FB." I hope he enjoys the QSL card and the photo of the '34 rig I took just after we finished our QSO.

My second contact was with Steve, KK7UV. Steve and I had made a sked on 80 meters. Now this was real radio. Steve was using his beautiful 1929 TNT rig while I was on the 1934 MOPA. I have never worked a self excited power oscillator before, what an experience! You can't call it "chirp." It



Author's shack as it looked during sked with KK7UV.

sounded more like the plucking of a rubber band strung around a shoe box. Very musical!

I now have a much greater appreciation for what amateur radio operators went

through to make a contact, and what they heard, 80 years ago. I hope to have a Hartley up and running soon!

'73 OM DE KB7NRN

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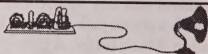
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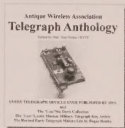
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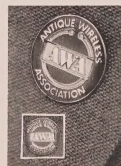
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